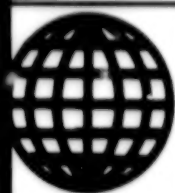


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UDC 616.831-008.918-07:616.832.9-008.8-02:612.763

Effects of Antiorthostasis on Resorption of Cerebrospinal Fluid and Hemodynamics in Conjunction with Elevated Intracranial Pressure

18400540C Moscow *PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA* in Russian No 1, Jan-Feb 89 (manuscript received 19 Jan 87) pp 23-26

[Article by B. A. Atchabarov, B. A. Abeuov and U. S. Sydykov, Scientific Research Institute of Regional Pathology, Kazakh SSR Academy of Sciences, Alma-Ata]

[Abstract] Outbred dogs were employed in a study of the effects of antiorthostasis in conjunction with elevated intracranial pressure on resorption of cerebrospinal fluid (CSF) and selected hemodynamic parameters. The purpose was to assess the significance of changes in hydrostatic pressure in the CNS on the dynamics of the CSF. Rotating the dogs into an antiorthostatic position resulted in a 300% increase in the intracranial pressure and a 200% increase in the blood pressure of the carotid artery and the jugular vein, and a decrease in the respiratory rate. Reduction of CSF resorption was attributed to elevation in intracranial pressure. The resultant increase in the pressure of the venous sinuses diminished the pressure gradient between the CSF and the channels into which the CSF is resorbed, and represents the primary factor limiting CSF resorption. Figures 3; references 9: 8 Russian, 1 Western.

UDC 616.281-02:612.766.1]-092.9-07:616.153:577.113.3

Effects of Vestibuloprotectors on Cyclic Nucleotides in the Modeling of Motion Sickness

18400540D Moscow *PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA* in Russian No 1, Jan-Feb 89 (manuscript received 12 Feb 87) pp 26-28

[Article by [Article by I. I. Leshchinyuk, Ye. O. Konov-alova, A. I. Kvitchataya, V. G. Shamray and Yu. G. Bobkov, Chair of Pharmacology and Pharmacognosy, Ukrainian Institute of Postgraduate Medicine, Kharkov]

[Abstract] Male Wistar rats were used to analyze the effects of conventional alkyl derivatives of 2-mercaptobenzimidazole—bemetyl and ethoxybemetyl—

on the status of cyclic nucleotides in induced motion sickness. The purpose was to ascertain a mechanism action of the antiemetics in animals subjected to rotation in a horizontal plane with an angular velocity of 18 deg/sec for 30 min. The antiemetics were administered intraperitoneally 60 min before rotation, in doses ranging from 50 to 200 mg/kg. Radioimmunoassays of plasma levels of cAMP and cGMP showed that cAMP increased from a control baseline of 69.8 pmoles/L to 180.0 pmoles/L after the rotation, and cGMP decreased from 13.55 to 9.68 pmoles/L. Both emetics exerted a corrective action under proper dosage conditions. Bemetyl was effective in limiting the rise of cAMP to 107.7 pmoles/L in a dose of 100 mg/kg, and in preventing the drop in cGMP in a dose of 50 mg/kg. Ethoxybemetyl was most effective in a dose of 200 mg/kg in minimizing the rise in cAMP to 75.6 pmoles/L, and in a concentration of 50 mg/kg in limiting the decrease in cGMP to 12.80 pmoles/L. These observations demonstrated that perturbations of the vestibular apparatus involve alterations of the cyclic nucleotide metabolism and that antiemetics exert their effects via regulation of the latter. References 13: 9 Russian, 4 Western.

UDC 616-07:681.3

Implementation of Konsultant-2 Medical Expert System Aboard Ships

18400566D Moscow *VOYENNO-MEDITSINSKIY ZHURNAL* in Russian No 2, Feb 89 pp 49-50

[Article by G. F. Grigorenko, Honored Physician of the RSFSR, Lt. Colonel of the Medical Corps; G. Ya. Zayats, Lt. Colonel of the Medical Corps; A. S. Kleshchev, docent, candidate of physicomathematical sciences; A. Ya. Lifshits, candidate of technical sciences; V. V. Samsonov; V. S. Sorokin; and M. Yu. Chernyakhovskaya, candidate of medical sciences]

[Abstract] A brief description is provided of the medical expert system Konsultant-2, which has been designed to facilitate diagnosis of acute abdominal conditions in personnel aboard ships. Basically, the physician interacts with the expert system in a dialogue mode for input of clinical data and retrieval of information. The system has been designed for ease of use and does not require the assistance of programmers or system operators. The time required for a diagnosis once all the clinical and laboratory data are in is one hour on a YeS-1061 computer. The Konsultant-2 expert system is currently undergoing revisions and improvements in order to expand its applicability aboard navy ships.

UDC 577.151.053:615.917

Prothrombin Activator from the Venom of Echis Multisquamatus

18400591B Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 6, Jun 89 (manuscript received 8 Oct 88) pp 75-79

[Article by T. P. Ugarova, T. N. Platonova, D. A. Solov'yev, Institute of Biochemistry, UkSSR Academy of Sciences, Kiev]

[Abstract] The venom from several snakes contain enzymes that activate prothrombin, and those activators have a specificity distinct from the Xa factor. Those extracted from Echis carinatus, Dispholidus typus, and others do not need additional cofactors to activate prothrombin. Ecarin, taken from Echis carinatus, activates prothrombin by cleaving the Arg323-Ile324 bond, producing meizothrombin, which further yields a-thrombin. A prothrombin activator was isolated from the venom of Echis multisquamatus, which inhabits Central Asia. Its action on prothrombin was explained and was compared with other activators. Ion exchange chromatography was used to extract ecarin from the snake venom, and then the proteins contained in the active fraction were separated. The activator exists in two forms that differ in charge. The enzyme is very unstable and quickly becomes inactive. The reaction of prothrombin and ecarin with fibrinogen yields meizothrombin, and the course of activating prothrombin with ecarin extracted from the venom of Echis multisquamatus is no different from what is described in the literature.

UDC 577.15-576.8.097.3

Monoclonal Antibodies for One-Step Production of Highly Pure Urokinase

18400617A Kiev BIOPOLIMERY I KLETKA in Russian Vol 5 No 3, May-Jun 89 (manuscript received 2 Nov 87) pp 95-101

[Article by G. A. Kratasyuk, L. Z. Yakubov, V. V. Sinitsyn, S. P. Domogatskiy, O. V. Rohklin, N. A. Byn'yayeva, Z. D. Fedorova, S. V. Koltsova, G. V. Samsonov, Institute of Experimental Cardiology, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Moscow; Institute of High-Molecular Compounds, USSR Academy of Sciences, Leningrad; Scientific Research Institute of Hematology and Blood Transfusion, RSFSR Ministry of Health, Leningrad]

[Abstract] Plasminogen activators—specific serine proteases that convert plasminogen to plasmin—are important in the elimination of thrombi. Found primarily in human urine, in low concentrations, urokinase is a human plasminogen activator, but it is not widely used in the clinic, because of the high cost of the industrial procedure for extracting and purifying the enzyme. In light of the fact that recent research has shown that sorbents with immobilized antibodies can be used to extract and purify proteins, the researchers set out to develop a technology for extracting highly pure urokinase on immunosorbents with monoclonal antibodies to the enzyme. They used a specially developed method for screening hybridoma clones to obtain high-affinity, specific monoclonal antibodies, which form the basis of the inexpensive, one-step method they propose for obtaining highly pure urokinase. A partially purified urokinase preparation was used for immunizing Balb/c mice. Radioimmunoassays were used as a "functional" test for revealing urokinase antibodies. The properties of the monoclonal antibodies depend on the screening system used. Two-step screening was used for revealing high affinity and specificity antibodies capable of sorbing urokinase from dilute, multicomponent protein solutions as an immunosorbent. Five independent clones that produce high affinity and specificity antibodies to human urokinase were obtained. Enzyme yield in the final preparation with respect to the original quantity in urine is 50-60%. The monoclonal antibodies produced imitate urokinase activity and can be used in clinical practice.

UDC 579.841.11:579.252.5].08

Use of Plasmid pTH10 in Construction of Donor Strains of *Pseudomonas Mallei*

18400593A Moscow MOLEKULYARNAYA GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGII in Russian No 4, Apr 89 (manuscript received 12 Apr 88) pp 14-18

[Article by N. P. Ageyeva, L. K. Merinova and M. K. Peters, Volgograd Scientific Research Antiplague Institute]

[Abstract] Nine wild and four auxotrophic strains of *Ps. mallei* were studied in connection with construction of suitable donor strains for conjugation, employing *E. coli* KS707 as donor of plasmid pTH10. Conjugation studies led to the isolation of six transconjugate strains of *Ps. mallei* bearing plasmid pTH10. Analysis of the transfer of chromosomal markers via pTH10 demonstrated the successful transmission of several markers to auxotrophic recipients with frequencies yielding 1-2600 recombinant clones per 10^8 cells. These findings demonstrated conjugative transfer of pTH10 and its stability in *Ps. mallei* cells, as well as its efficient expression. An attempt at preparation of donor strains based on homology between pTH10 and the chromosome using the plasmid-based transposon Tn1 was unsuccessful. Among *Ps. mallei* clones resistant to phage PRD1 subclones were found with the Tc^rKm^rAp^r phenotype in which pTH10 was presumably integrated into the chromosome. Repeated transfer of pTH10 into the cells imparted to them the capacity for transferring auxotrophic chromosomal markers to recipients. Figures 1; references 9: 5 Russian, 4 Western.

UDC 616.98:[579.842.23:579.253]-036.21-078

Plasmid Screening of *Yersinia Pestis* From Different Endemic Areas for Plague in Central Asia

18400593E Moscow MOLEKULYARNAYA GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGII in Russian No 4, Apr 89 (manuscript received 21 Jun 88) pp 39-42

[Article by S. V. Balakhanov, Scientific Research Antiplague Institute of Siberia and the Far East, Irkutsk]

[Abstract] A screening study was conducted for plasmids borne by *Yersinia pestis* isolates obtained in different endemic zones in Central Asia (Saylyugem Range, Tuva, the Khurkhin area in Mongolia, Transbaykal). Evaluation of the plasmid profiles yielded basically three types of plasmids falling into the following broad MW categories: 6, 46-47, and 61-67 MD. However, in the case of the Tuva isolates an additional 15-16 MD plasmid was identified. Figures 1; references 14: 7 Russian, 7 Western.

UDC 575.13:577.21:579.25.5

Genetic Systems of Biodegradation: Organization and Regulation of Expression

18400596A Moscow GENETIKA in Russian Vol 25 No 4, Apr 89 (manuscript received 19 May 88) pp 581-594

[Article by A. M. Boronin, T. V. Tsoi, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] Although many xenobiotics are degraded rather efficiently by soil and aqueous microflora, compounds such as halogenated compounds are very persistent, a fact that makes biodegradation—the complete or partial degradation of organic compounds by microorganisms—a pressing issue. The persistence of halogenated compounds makes the development of strains of microorganisms that degrade them necessary. The authors here summarize the experimental data assembled to date on the structural and functional organization and regulation of genes of D-system plasmids and on their use in building strains with an elevated capacity for degrading toxic compounds or a capacity for degrading compounds not degraded by natural strains. They analyze the organization of plasmid systems of biodegradation, including the TOL plasmid pWWO, the NAH7 genetic system, a genetic system for degrading 3-chlorobenzoate and 2,4-dichlorophenoxyacetate, and h-alkanes and camphors. Regulation of transcription of plasmid metabolic operons on the basis of data on the xyl- and nah-operons. The authors also include a discussion of the evolution of genetic biodegradation systems and the prospects for constructing new metabolic pathways that represent a promising approach to solving problems of protecting the environment from toxic pollutants that are not decomposed naturally. Figures 4, references 69: 4 Russian, 65 Western.

"Human Genome": Beginning of a Race

18402041a Moscow MEDITSINSKAYA GAZETA in Russian 19 Apr 89 p 2, col 6

[Article by Ye. Kokurina]

[Abstract] An interview with academician A.A. Bayev was reported. In August 1988 the program "Human Genome" was established by a special decree of the Soviet of USSR Ministers. Presently research is underway in USSR Academy of Sciences Institutes of: Molecular Biology, Bioorganic Chemistry, Molecular Genetics, General Genetics, Cytology, Medical Genetics, etc. The goal of this program is to investigate human genome - the totality of all genes in cell chromosomes: to sequence about 3 billion nucleotide base pairs, determining the exact site of each gene in the chromosome and to establish nucleotide sequence in each one of them. Based on this the goal is to discover the laws governing life processes. The studies will cover the ethical problems of the decision making once the "predeterminants" for

certain diseases are established and the ways to counteract them are developed. Prenatal diagnosis would be greatly assisted by discovering the genome secrets. However, some ethical and social problems are yet to be resolved. In contrast to American prediction that this project will need about 15 years to completion, academician Bayev refused to speculate on any dates. The program is planned in the USSR to last at least to 2005. The final date will depend on immediate events. The USSR lags behind the USA in this area: out of 1,800 publications in the past five years 40% are from the USA and only 3% from the socialist countries; 1,500 genes

were characterized and less than ten by Soviet scientists. The reasons have to be in the Lysenkoism and its effect on genetic studies. The most urgent task now is to develop new methodology and obtain equipment along with various reagents necessary for this work. For this the state allocated 25 million rubles. Presently there are no domestically produced sequencers in the USSR. The work is limited to simple organisms: bacteria, drosophila and such where manual technology is possible.

07813

UDC 577.391:591.473

Influence of Helium-Neon Laser Radiation on Structural and Metabolic Properties of Skeletal Muscles Exposed to Ionizing Radiation

18400522C Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 306 No 2, May 88
(Manuscript received 27 Sep 88) pp 482-485

[Article by M. F. Popova, T. A. Telegina, Sh. G. Ilyasova, and I. D. Bekhoyev, Institut of Evolutionary Morphology and Ecology of Animals imeni A. N. Severtsov, USSR Academy of Sciences; Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow]

[Abstract] The helium-neon laser is very popular as a method of stimulating regeneration of organs and tissues of mammals exposed to ionizing radiation. This article studies the influence of laser therapy on structural conversions of muscles that are exposed to 20 Gy radiation and are mechanically traumatized, as well as on their content of RNA. Work was performed on 62 male white rats; a posterior extremity was exposed to 20 Gy X-radiation, with the remainder of the body shielded with lead. Morphologic studies showed that laser therapy normalized the metabolism of the irradiated tissue, restoring the regenerative process. The laser radiation can increase synthesis of RNA in the irradiated and mechanically traumatized skeletal muscles. Low-intensity laser radiation decreases lipid peroxidation of intracellular membranes and increases RN synthesis, while activating adenylate cyclase and ATP synthesis in the irradiated tissue. References 14: 12 Russian, 2 Czech.

UDC 577.322.6

Effects of Low-Intensity Radiation on the Formation of Liquid-Crystalline Structures in Glycoprotein Solutions

18400569B Moscow MOLEKULARNAYA BIOLOGIYA in Russian Vol 23 No 2, Mar-Apr 89
(manuscript received 30 Mar 88; in revised form 25 Jul 88) pp 416-421

[Article by S. A. Skopinov, S. V. Yakovleva, Y. A. Denisova, A. A. Vazina and L. A. Zheleznyaya, Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast; Ural Polytechnical Institute, Sverdlovsk; Scientific Research Computer Center, USSR Academy of Sciences, Pushchino]

[Abstract] The layer of mucus that coats the internal organs—made up primarily of glycoproteins—facilitates

exchanges with the external environment in processes such as respiration and digestion. Defects in the layer, such as wounds or ulcers, disrupt the metabolism. An effective means of correcting damage to the mucosa is light treatment that involves the low-intensity radiation of a helium-neon laser ($\lambda = 633 \text{ nm}$, $P = 1\text{-}20 \text{ mW}$). Noting that, at certain concentrations, such glycoproteins form an ordered liquid-crystalline structure in aqueous solution, the researchers here used polarization microscopy and spectrophotometry to identify the liquid-crystalline structure formation induced by helium-neon laser action in high MW glycoproteins derived from the mucus of porcine small intestine. Subjecting the glycoprotein ($2 \times 10^6 \text{ D}$) solutions to laser action ($2.5\text{-}10 \text{ mW}$; 3 min ; 28°C ; 250 lux illumination) with mixing in the presence of hydrogen peroxide led to aggregative and optical changes. The former changes were evident in the formation of spheroidal aggregates, a structural form characteristic of lyotropic systems. These observations were attributed to the interaction of the $\text{H}_2\text{-H}_2\text{O}_2$ matrix with the glycoprotein molecules. Detailed physicochemical description of this process shall have to await further studies. Figures 3; references 10: 6 Russian, 4 Western.

UDC 612.85.014.481

Influence of Low-Power Laser Radiation on Functional Status of Auditory Analyzer (Experimental Study)

18402068A Moscow VESTNIK OTORINOLARINGOLOGII in Russian No 2, Mar-Apr 89 (Manuscript received 23 Aug 88) pp 29-34

[Article by M. R. Bogomil'skiy, L. N. Fitenko, I. N. Dyakonova, A. M. Tikhomirov, V. Minasyan, M. A. Shuster, V. I. Rechitskiy, Department of Otorhinolaryngology, Pediatric Faculty, Second Moscow Medical Institute imeni N. I. Pirogov; Department of Otorhinolaryngology, Moscow Oblast Clinical Scientific Research Institute imeni M. F. Vladimirovskiy]

[Abstract] A study is made of the functional status of the auditory analyzer of guinea pigs following long-term irradiation of the middle ear by a low-energy helium-neon laser radiation using a type LG-75 laser. Irradiation at $15\text{-}17 \text{ mW}$, total dose 63 J/cm^2 , one-time exposure 5 minutes, 14 sessions, was found to result in local and general changes. Local changes included an increase in the amplitude of the first ERA peak, an increase in the A_1/A_2 ratio, shortening of L_1 at low sound intensities, indicating increased excitability of the first element in the auditory analyzer. General changes included bilateral reduction in the central conduction time, greater on the side exposed to laser radiation. References 8 (Russian).

UDC 615.478.7.03:615.835.2

Experimental Chamber with Artificial Mountain Climate*18400514b Moscow MEDITSINSKAYA TEKHNIKA in Russian No 1, Jan-Feb 89 (manuscript received 30 Mar 88) pp 40-43*

[Article by V. A. Berezovskiy, V. Ya. Zhuravlenko, N. M. Ulanov, L. T. Pilipenko, V. T. Pedanov, N. P. Ocheretyanko, M. I. Levashov, V. N. Rozhanchuk, and N. M. Pukh; Institute of Physiology imeni A. A. Bogomolets, UkSSR Academy of Sciences, Kiev; Institute of Problems in Oncology imeni R. Ye. Kavetskiy, UkSSR Academy of Sciences, Kiev; Institute for Engineering Thermal Physics, UkSSR Academy of Sciences, Kiev; Kiev Branch of the All-Union Scientific Research and Design Institute of Synthetic Fibers]

[Abstract] It has been established that for treating a number of diseases, it is necessary to maintain stable atmospheric conditions: a normal atmospheric pressure, optimum temperature and humidity, a given concentration of ions in the air, and wind velocity. Such air parameters were set up in the biotron developed under the direction of Professor D. I. Panchenko. However, the gas composition in the biotron was analogous to that of atmospheric air, which reduced the biotron's sphere of application and the therapeutic effectiveness. The Institute of Physiology, jointly with the Institute of Engineering Thermal Physics and the Kiev Branch of the All-Union Scientific Research and Design Institute of Synthetic Fibers, has developed a design for a treatment-and-prevention chamber with an artificial mountain climate. Such environmental chambers make it possible to conduct therapeutic-preventive and rehabilitative treatment of diseases of the respiratory system, central nervous system, circulation, hemopoiesis, etc. This chamber is equipped with instruments for controlling the O₂ and CO₂ content, temperature, humidity, and ionization level of the gas-air medium. The oxygen-depleted gas medium is replenished with the aid of an air duct that passes through a unit for controlling the temperature and humidity of air and is then circulated back into the chamber via an air distributor. An aqueous solution of lithium chloride is used as an absorbent for the following reasons: it can produce a gas-air medium with a moisture content of 1 g/kg, it helps to keep the chamber temperature within 0-25° C, it acts as a bactericide and deodorizer of the gas-air medium, it is safe for humans, and it is economical. Tests of the chamber in a

Kiev hospital, at which research has begun on developing a treatment methodology for a number of diseases, have demonstrated the chamber's efficiency. Figures 1; references 4 (Russian).

UDC 612.82.014.49.06:612.766.2].08

Restructuring Bioelectrical Brain Activity upon Adaptation to Chronic Hypokinesia*18400518B Moscow GIGIYENA I SANITARIYA in Russian No 2, Feb 89 (Manuscript received 16 Jun 87) pp 32-35*

[Article by N. G. Zhuravleva, Scientific Research Institute of Labor Hygiene and Occupational Diseases, USSR Academy of Medical Sciences, Moscow]

[Abstract] This article discusses an aspect of a research effort, the overall purpose of which was to study the effects of chronic hypokinesia on the central nervous system and the aftereffects of hypokinesia for learning memory in experiments on rats. This portion of the research studies the restructuring of the total bioelectrical activity of the brain. This was done by recording amplitude-frequency characteristics of the average evoked visual potential in response to an indifferent stimulus, as well as the integral activities of a background electroencephalogram, the EEG component of the orientation reaction to a series of 500 Hz tones and the restructuring of EEG rhythm in response to rhythmic photostimulation at 25 Hz. Constant proprioceptive deprivation of the brain was found to cause restructuring of its slow bioelectrical activity with decreasing general level of activity and a compensatory increase in reaction to external signals. The restructuring is organic in nature and cannot be relieved by one-time or episodic effects activating muscle tonus. The results include a decrease in the functional capabilities of the brain, an increase in the physiological force of a stimulus and asthenization of the brain in situations with great nerve stress. Figures 4; References 17: 15 Russian, 2 Western.

UDC 612.8.015

Influence of the β -Endorphin on Acquired Forms of Nervous Activity in Monkeys*18400523A Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 306 No 3, May 89 (Manuscript received 14 Sep 88) pp 743-747*

[Article by USSR Academy of Sciences Corresponding Member A. I. Karamyan, USSR Academy of Medical Sciences Member Yu. A. Pankov, T. N. Sollertinskaya, V. A. Siketin, I. Kofman, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad; Institute of Experimental Endocrinology and Hormone Chemistry, USSR Academy of Medical Sciences, Moscow]

[Abstract] A study is made of the role of β -endorphin in the regulation of the conditioned reflex activity of intact and neurotized *Macaca mullatta* monkeys. Neurotization was produced by confronting the immobilized monkeys with a biologically adequate extreme stimulus, an emotionally negative model of a serpent. The experiments indicated that systemic administration β -endorphin caused brief relief of neurotic states (for up to three days), followed by subsequent restoration and, possibly, intensification of the states. The effect of β -endorphin is greater in animals with functional CNS pathology. The greater influence of the preparation on differentiated inhibition with a decrease in percentage of positive conditioned reactions may indicate that β -endorphin has a primarily inhibiting influence on conditioned reflex activity of the brain. References 15: 10 Russian, 5 Western.

UDC 612.8.015

Influence of Naloxone and Delta-Sleep-Inducing Peptide on Homocarnosine Content in Brain Tissue

18400534C Kiev UKRAINSKIY BIOKHMICHESKIY ZHURNAL in Russian Vol 61 No 2, Mar-Apr 89 (Manuscript received 9 Mar 88) pp 112-114

[Article by M. G. Makletsova, A. M. Mendzheritskiy, N. I. Uskova, I. O. Chorayan, M. Bayich, V. Ivetich, D. Filipovich, Rostov University; Department of Physiology, Medical Institute, Novi Sad, Yugoslavia]

[Abstract] Homocarnosine, gamma-aminobutyryl-L-histidine, is a central nervous system peptide thought to act as an inhibiting neuromediator. Naloxone is a specific antagonist of morphine and other narcotics. The authors studied the influence of naloxone and delta-sleep-inducing peptide, a mammalian neuromediator system modulator which does not interact with the opiate receptors, on the content of homocarnosine in cerebral structures. It was found that i/v administration of naloxone has no statistically reliable influence on the content of homocarnosine in the brain and is most effective for peripheral and somatic nervous system receptors. Intraperitoneal administration decreased the homocarnosine level in the striatum, hypothalamus, cerebellum and medulla oblongata. Intraperitoneal injection of delta-sleep-inducing peptide greatly increased homocarnosine content in the brain. References 15: 9 Russian, 6 Western.

UDC 612.7.009

Cerebral Blood Circulation During Stressful Mental Work

18400546a Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 15, No 2, Mar-Apr 89 (manuscript received 1 Oct 88) pp 48-55

[Article by B. M. Fedorov, T. V. Sebekina, Ye. N. Streltsova, V. M. Vakulenko, T. M. Sinitsyna, and T. G. Nikolayeva, Moscow]

[Abstract] Mental work has a substantial effect on the cardiovascular system and regional cerebral blood circulation. Tests requiring mobilization of attention, memory, and mental stress while solving mathematical and linguistic problems have been used successfully in diagnosing initial symptoms of hypertonia and predicting the development of cardiovascular diseases. In this work, 50 healthy males aged 25-40 were given arithmetic and linguistic problems to solve within short time spans. For determining the effect of mental work on regional blood circulation in the brain, ^{133}Xe with an activity of 8 MBq was introduced intravenously in an isotonic solution. Indicators of blood flow were determined in 15 zones of each cerebral hemisphere and separately in the gray and white matter (in ml/min per 100 g of tissue) with the Valmet B-1-1400 Analysis stereo device. Changes in cerebral blood circulation during mental work under stress were caused primarily by the redistribution of regional blood flow in cerebral structures. When arithmetic problems had to be solve "in one's head" within a time limit, an increase in regional blood flow was typical in the gray matter of the left hemisphere, especially in the region containing the supramarginal gyrus and part of the angular gyrus and the temporoparietal-occipital subregion, in the superior frontal gyrus, and, in most cases, in the Broca's area and superior temporal gyrus. During mental work under stress, an increase in the blood flow rate in the common carotid and internal carotid arteries was accompanied by a decrease in anastomosis reactivity between branches of the internal and external carotid arteries. Figures 2; references 23: 17 Russian, 6 Western.

UDC 612.821

Omegametry in Studying the Functional State of Healthy Individuals with Normal and Hypertonic Reactions to Controlled Physical Exertion

18400546b Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 15, No 2, Mar-Apr 89 (manuscript received 16 Sep 88) pp 60-65

[Article by V. A. Ilyukhina, V. V. Tkachev, B. M. Fedorov, G. D. Reushkina, T. V. Sebekina, and T. M. Sinitsyna, Moscow]

[Abstract] Of current interest is the search for non-invasive methods to test the adaptive capabilities, reserves of primary regulator systems, and inter-system interactions of the human body. Omegametry, which involves discrete or continuous recording from head and body surfaces of spontaneous and induced changes in the mV-range component of a super-slow physiological process, has been shown to provide an integrated evaluation of the functional state and adaptive system responses of the body in normal and pathologic conditions. In this work, omegametry was used in conjunction with standard indicators of the state of the cardiovascular system to study the adaptive capabilities of the bodies of healthy individuals with normal and hypertonic responses to controlled physical exertion. In the experiment, 16 men, aged 20-40, performed repeated workouts on a bicycle ergometer. The ω -potential was measured with EVL-1M3 electrodes attached to the head and right hand and with portable direct current amplifiers produced at the

production association Krasnodarskiy ZIP. Dynamics of the ω -potential in conjunction with hemodynamic indicators allowed the pre-exertion states of individuals with adequate and hypercompensating responses to controlled physical stress to be differentiated. In individuals with adequate hemodynamic responses to physical stress in the initial (pre-exertion) state, the ω -potential registered primarily in the 21-40 mV range, while it registered in the 41-60 mV range in individuals with a hypercompensating response. Figures 2; references: 14 Russian.

UDC 577.352.5:612.822:612.825

Blocking Action of *Nephila Clavata* Spider Toxin on Ionic Currents Activated by Glutamate and its Agonists in Isolated Hippocampal Neurons

18400592A Kiev NEYROFIZIOLOGIYA in Russian
Vol 21 No 2, Mar-Apr 89 (manuscript 21 Dec 87)
pp 152-160

[Article by N. I. Kiskin, E. M. Klyuchko, O. A. Krishtal, A. Ya. Tsyndrenko, N. Akaike, N. Kawai, Institute of Physiology imeni A. A. Bogomolets, UkSSR Academy of Sciences, Kiev]

[Abstract] *Nephila clavata* and *Argiope lobata* spider toxins are among the toxins that block synaptic transmission in the glutamate-mediated synapses of vertebrates and invertebrates. *Nephila clavata* toxin (JSTX) irreversibly blocks synaptic transmission in the giant synapse of the stellate ganglia in squid and in the neuromuscular synapse in crustaceans where glutamate is a synaptic mediator. Irreversible blocking action by JSTX of a glutamate-mediated synaptic transmission and the depolarized responses induced by glutamate application were also discovered in the hippocampus of mammals. Glutamate receptors in mammalian central nervous systems are divided into receptors that are activated by N-methyl-D-aspartate (NMDA) and non-NMDA type receptors—quisqualic and kainic acid receptors. The effect of JSTX and its active fraction on ionic currents activated by glutamate, quisqualic and kainic acid in the membranes of isolated hippocampal neurons was studied using the pyramidal neurons of rat hippocampus. It was revealed that the blocking action of JSTX may be used to identify the type of synaptic transmission. In spite of the irreversible action of JSTX, it is hypothesized that it cannot completely suppress chemically activated ionic currents. The results are additional proof that JSTX, which effectively interact with invertebrate peripheral glutamate receptors, can also

affect mammalian central glutamate receptors. Figures 4, references 15: 3 Russian, 12 Western.

UDC (049.3):612.82

Brain Structures or Neural Networks?

18400592B Kiev NEYROFIZIOLOGIYA in Russian
Vol 21 No 2, Mar-Apr 89 (manuscript received
21 Nov 88) pp 277-278

[Review by Yu. P. Limanskiy of book by V. A. Cherkas, "Brain Structures or Neural Networks?" Naukova Dumka, 1988, 92 pages]

[Abstract] In his book, Cherkas regards the brain as a three-category anatomical and physiological system consisting of a projection, modal-specific system that encompasses sensory and motor paths; narrowly specialized centers such as the respiratory, digestive, and vasomotor centers; and a "gigantic three-dimensional neural network that combines all of the nerve cells, synaptic endings, neuropil, and origins of efferent fibers," which he calls the intercessory brain. The intercessory brain is not a diffuse cellular mass, but is distinguished by physiologically identical combinations of neurons. According to Cherkas, it is unlike any other system, but is multifunctional and participates in the organization of various functions, as well as in information processing. The reviewer feels that the book will be of interest to those who study the activity of the central nervous system, but he suggests that Cherkas could have made more use of the theoretical advances that have been made by modern neurophysiology and neurochemistry in the study of the structure and functions of the neuroregulatory system that combines various groups of brain neurons.

UDC 615.31:547.473.2].017:615.23].015.4.07

Abatement of Hypoxic Effects on Conjugate Functions of Skeletal Muscle Vessels by γ -Hydroxybutyric Acid (GHBA)

18400599A Moscow PATOLOGICHESKAYA
FIZIOLOGIYA I EKSPERIMENTALNAYA
TERAPIYA in Russian No 2, Mar-Apr 89 pp 31-35

[Article by Yu. I. Ibragimov and B. I. Tkachenko, Department of Physiology of Visceral Systems, Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad]

[Abstract] Clinical data that GHBA exerts a protective effect in hypoxic situations led to an experimental analysis of the effects of this agent on the hemodynamics of skeletal muscles in control and hypoxic states. The study was conducted on the shank musculature of cats anesthetized with urethane (0.5 g/kg), with assessment of vascular resistance, capacitance, perfusion pressure,

oxygen exchange, and so forth. Regional intravascular administration of 5, 10, 15, 20, or 40 mg/min GHBA resulted in either a transient (38-52 sec) increase (by 3.7-7.3%) or decrease (8.2-20.9%) in the perfusion pressure in the absence of any evidence of a dose-effect relationship. However venous outflow showed a dose-dependent increase from 0.06 to 0.62 ml/100 mg. In addition, in 100% of the cases capillary filtration increased by 32.6% with 10 mg/min GHBA, and post-capillary resistance fell in 70% of the cases by 19.7% and remained unaffected in the remaining cases. In general, GHBA was shown to act as a vasodilator and served to enlarge the functional capillary surface area, preparing the vascular bed of the skeletal muscles for a subsequent hypoxic challenge presented by inhaling an air mixture with 8% oxygen. Hypoxia alone increased oxygen uptake by the skeletal muscles by 13%; however, in GHBA-pretreated system the increase was on the order of 40%. Figures 2; references 12: 8 Russian, 4 Western.

UDC 616.12-008.318-02613.863]-085.31:547.96]-092.9

Effects of Delta Sleep Inducing Peptide on Electrical Instability of Heart During Emotional Stress

18400599C Moscow PATOLOGICHESKAYA
FIZIOLOGIYA I EKSPERIMENTALNAYA
TERAPIYA in Russian No 2, Mar-Apr 89 pp 45-49

[Article by M. I. Arkhangelskaya and M. A. Zvyagintseva, Laboratory of Experimental Cardiology, All-Union Scientific Research Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow]

[Abstract] Based on the observations that delta sleep-inducing peptide (DSIP) prolongs survival of animals subjected to stress, an analysis was conducted on the effects of DSIP on ventricular extrasystoles in experimental stress. The studies were conducted on 2.5-3.0 kg chinchilla rabbits treated i.v. with 60 nmoles/kg DSIP before or after stress (immobilization with electrical stimulation of the skin or ventromedial hypothalamic nuclei). DSIP was found effective within 10 min of administration in terms of diminishing or abolishing the extrasystoles, with administration 10-15 before stress-induction shown to yield optimum effects. Studies with intact animals demonstrated that DSIP elevated the electrical thresholds for extrasystoles, whereas treatment of the animals with anti-DSIP antibodies lowered the threshold. On balance, the antistress efficacy of DSIP appears to be due to its systemic effects as well as to a direct action on the heart. Figures 4; references 23: 15 Russian, 8 Western.

UDC 611.813.1-018:612.273.2

Ultrastructural Changes in the Neurons of the Cerebral Cortex in the Muskrat in Acute Hypoxia

18400612a Leningrad ARKHIV ANATOMII,
GISTOLOGII I EMBRIOLOGII in Russian Vol 96
No 4, Apr 89 (manuscript received 13 Oct 88) pp 5-10

[Article by A. P. Novozhilova, Laboratory of Structural and Functional Adaptations, Physiological Scientific Research Institute imeni A. A. Ukhtomskiy, Leningrad State University]

[Abstract] The structural expression of adaptive changes of the neurons in the cerebral cortex of animals (seal, walrus, muskrat, etc.) whose bodies have adapted to periodic oxygen deficiencies was studied as part of a series of research dedicated to studying the structural and functional adaptations of the brain to hypoxia (when diving) in aquatic and semiaquatic mammals. The sensorimotor area of the cortex was studied in a muskrat (*Ondatra zibethica*) that was kept underwater for 11.5 minutes. When the motor responses ceased, the animal was removed from the water and anesthetized, and small sections of the cortex were removed and studied with an electron microscope. The varying degree of expression of the changes in the neuropil structure was particularly noted. In most cases the neurons had individual signs of alteration which were apparently reversible. The appearance of autophagosomes in the muskrat cerebral cortex is caused by changes in biochemical reactions. Free radicals that form in the oxidation process also damage membranes, causing mass formation of autophagosomes which are not a sign of irreversible destruction themselves, but are witness to the considerable accumulation of harmful substances in the brain tissue. The marked changes reflect extensive biochemical displacements developed as a result of prolonged adaptive evolution and are associated with a change from aerobic to anaerobic metabolism. Although all of the structural changes of the cells described are caused by hypoxia, they are not strictly a result of it, and can be caused by other effects—such as physical stress, deafferentation, or the presence of neurotoxins. Figures 3, references 17: 13 Russian, 4 Western.

UDC 591.044.1:591.111.2

Cytospectrophotometric Examination of Hemoglobin in Human Erythrocytes. II. Methemoglobin Formation in Acute Hypobaric Hypoxia

18400612B Leningrad TSITOLOGIYA in Russian
Vol 31 No 4, Apr 89 (manuscript received 1 Dec 87)
pp 465-468

[Article by L. V. Filev, S. F. Yenokhin, I. I. Zakharov, G. V. Selivanova, D. I. Korotkov, and V. A. Kuznetsov, Institute of Cytology, USSR Academy of Sciences, Leningrad]

[Abstract] Oxidizing stress of erythrocytes and activation of processes for protecting hemoglobin and the membranes of erythrocytes from oxidation occur during acute hypobaric hypoxia, but it is not known whether methemoglobin (MtHb) formation or its suppression dominates. The research presented here consisted of a cytospectrophotometric study of the absorption spectra of hemoglobin in erythrocytes with varying membrane structure and a study of the composition of erythrocyte populations, their osmotic and acidic resistance, and lipid peroxidation in acute hypobaric hypoxia. Ten healthy men who had been subjected to acute hypobaric hypoxia for 48 hours were examined for hemoglobin concentration, erythrocyte and reticulocyte levels, and osmotic stability and acidic resistance of erythrocytes. Fetal erythrocytes were studied with a technique advanced by Isayeva, blood smears were cytospectrophotometrically analyzed, and lipid peroxidation was assessed by means of a determination of malonic dialdehyde in blood serum. During acute hypobaric hypoxia, an increase of the hemoglobin concentration in the blood occurs, but the number of erythrocytes and fraction of reticulocytes drops. Lipid peroxidation increases, which apparently leads to accelerated aging of the erythrocytes, increased methemoglobin formation in them, disturbance of osmotic stability and acidic hemolysis. After acute hypobaric hypoxia, the erythrocyte population is extremely heterogenous, with an enlarged fraction of echinocytes and fetal erythrocytes, which are more resistant to MtHb formation and acidosis. The growth in hemoglobin occurs as a result of a new population of erythrocytes that have an elevated concentration of hemoglobin and are resistant to peroxides and acid hemolysis. Activation of fetal erythropoiesis and, possibly, MtHb formation protect erythropoiesis from acute hypobaric hypoxia and peroxidation of the erythrocyte membranes. References 16: 13 Russian, 3 Western.

UDC 547.967.4:612.81

Effect of a Fragment of the Growth Factor of Nerve Tissue and ACTH-(4-7)-Pro-Gly-Pro on Learning and Memory and Modification of This Effect Using a Magnetic Field

18400613A Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 6, Jun 89 (manuscript received 24 Sep 88) pp 91-93

[Article by R. A. Danilova, Ch. A. Asabaev, B. S. Sadritdinov, G. I. Chipens, O. S. Papsuyevich, V. N. Nezavibatko, A. A. Folomkina, Yu. A. Kholodov, R. I. Kruglikov, Order of the Red Banner of Labor Institute of Organic Synthesis, LaSSR Academy of Sciences Moscow State University imeni M. V. Lomonosov; Tashkent Pharmaceutical Institute, UzSSR Ministry of Health; Institute of Molecular Genetics, USSR Academy of Sciences; Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences]

[Abstract] The space program has directed the attention of researchers to the study of the effects of geophysical

and space factors on the individual. Scientific-technical progress has also pushed the question of how the electromagnetic fields created by modern equipment and appliances affect those in the workplace and in the home. Continuing some of their earlier work (Folomkina et al., IZV. AN LatvSSR, 1988, No 3, pp 130-133), the researchers here studied the modification by a magnetic field of the effects of the hexapeptide NGF-(52-57) and the prolonged-action memory stimulator ACTH-(4-7)-Pro-Gly-Pro on the development and maintenance of defensive conditioned reflexes. The effect of the magnetic fields on the action of analgesic-electroshock is also studied. Conditions reflexes for active avoidance, bilateral avoidance, and passive avoidance were developed in female white rats each of whom was injected with 5µg peptide before each learning session. The NGF fragment was shown to accelerate the development of active avoidance and bilateral avoidance, but did not change retention time. When NGF-(52-57) and ACTH-(4-7)-Pro-Gly-Pro were given, the maintenance of passive avoidance reflexes improved. Experimental data show that the magnetic field nullified the improvement brought about by the ACTH-(4-7)-Pro-Gly-Pro in the retention of the passive avoidance reflexes, but did not affect the changes induced by the NGF-(52-57). The researchers surmise that the difference in the effects of the magnetic field may be due to the fact that the peptides used in the study affect different sectors of the brain. In a final set of experiments, the researchers found that the magnetic field deepened the amnesia produced by electroshock after passive avoidance was learned. It is hypothesized that the magnetic field is capable of correcting many neuropeptide effects. References 8: 5 Russian, 3 Western.

UDC 547.964.4

Effect of TKP Tripeptide and Other Polarines on the Different Directions of Changes of Various Functions of Macrophages

18400613C Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 6, Jun 89 (manuscript received 29 Nov 89) pp 100-106

[Article by G. I. Chipens, I. S. Freidlin, N. K. Artyemenko, O. Ye. Kolesova, Ye. P. Kiseleva, T. S. Freidlin, Order of the Red Banner of Labor Institute of Organic Synthesis, LaSSR Academy of Sciences; 1st Order of the Red Banner of Labor Leningrad Medical Institute imeni I. P. Pavlov; Order of the Red Banner of Labor Scientific Research Institute of Experimental Medicine, USSR Academy of Medical Sciences]

[Abstract] A concept the researchers advanced in earlier work (Chipens et al., IZV AN LatvSSR, 1987, No 6, pp 41-49) hypothesized the existence of a special system of bioregulation with low-molecular-weight peptides that are formed from precursor proteins in reactions of limited proteolysis in the body. The peptides are called tetines, because of their putative role in the transmission of information during tête-à-tête cooperation among the

cells. The work of French researchers prompted the researchers here to study the tripeptide Thr-Lys-Pro (TKP), an immunoglobulin fragment that, like tuftsin and rigine, is a potential candidate as a tetine-class bioregulator. Chipens et al. performed a comparative study of the effects of tuftsin and various polarine—a subgroup of tetines consisting exclusively of polar or hydrophobic amino acid residues—on the clearance function of the abdominal cavity of mice soon after infection with *Salmonella typhimurium* and on the bactericidal activity of peritoneal macrophages against the same bacteria. Tuftsin and TKP, which is three times stronger than tuftsin, produced the most consistent clearance. Polarines SKE and RKD had a slight inhibiting effect on the clearance level. The changes brought about in clearance level by the peptides clearly reflected their influence on the basic defense function of macrophages—their bactericidal activity. TKP, an immunomodulator, substantially accelerates the process of clearing the abdominal cavity of injected bacteria by increasing the bactericidal activity of the peritoneal macrophages in mice. The researchers conclude that TKP action in the body is mediated by some additional mechanism. Figures 4, references 14: 4 Russian, 10 Western.

UDC 612.822.3+615-017.8

Effects on Rat Brain of Low Concentrations of Perorally Administered Alkaloid-Containing Substance, Ignatium-Amar

18402006B Moscow ZHURNAL VYSSHEY NERVNOY DEYATELNOSTI IMENI I. P. PAVLOV in Russian Vol 39 No 1, Jan-Feb 89 (manuscript received 30 Aug 88) pp 148-151

[Article by L. D. Umanskiy, I. V. Yermakova, N. G. Mikhaylova, Ye. V. Loseva and L. V. Nozdracheva, Municipal Homeopathic Polyclinic; Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences, Moscow]

[Abstract] Neurophysiological studies were conducted on outbred male rats (200-250 g) to assess the mechanism of action of low per os doses of ignatium-amar, a homeopathic preparation used in the treatment of neurogenic disorders. Ignatium-amar was administered with drinking water in a 10^{-12} dilution; it contained 3% alkaloids (35-60% strychnine). Administration of the preparation elicited bursts of high-amplitude discharges in the parietal lobe, in the dorsomedial nucleus, and in the lateral hypothalamus. Periods of enhanced electrical activity alternated with periods of diminished activity, subsequently replaced by a pattern of slow, irregular activity and a decrease in the number of active neurons. Biochemical studies demonstrated enhanced energy metabolism in the brain tissues of ignatium-amar-treated rats. Ultrastructural analysis of synaptic vesicles yielded data indicative of diminished neural transmission. On balance, the data were interpreted to indicate that ignatium-amar, in subminimal concentrations, leads to a protective response in the brain in the

form of "protective" inhibition. The latter phenomenon serves to protect the CNS from undue reactivity to weak and inconsequential stimuli that would otherwise deplete the energy reserves of the brain. Figures 2; references 5 (Russian).

UDC 591.105

Qualitative and Quantitative Changes in Biosynthesis of Protein Resulting From Hypoxia and Transplantation of Embryonal Nerve Tissue into Adult Mammal Brain

18402081d Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian No 2, Mar-Apr 87 (manuscript received 7 Aug 87) pp 285-290

[Article by V. N. Vitvitskiy and M. R. Ventskovich, Institute of General Genetics imeni N. I. Vavilov, USSR Academy of Sciences, Moscow]

[Abstract] Two approaches were used in studying changes in biosynthetic processes in the rat brain cortex: quantitative study of ^3H -leucine incorporation into cortical proteins in a segment of the transplantate, and investigation of qualitative changes in the electrophorograms of proteins of the cytoplasm of cortical cells in the segment of the transplantate. The study group included normal rats and rats exposed to hypoxic hypoxia and to hypoxia followed by transplantation of embryonal nerve tissue into the brain. Significant increase in the incorporation of biosynthetic precursors was noted in the early phase after transplantation in both normal and hypoxic animals; this phenomenon lasted for up to 100 days after transplantation. This led to accumulation of protein on electrophorograms in the molecular weight range of 40-45 kD and 35-39 kD, both in local insult cases (transplantation) and those with general hypoxia. This appears to be a reaction of nerve cells to the injury and not to the presence of a transplanted embryonal brain segment. Figures 3; references 13: 8 Russian 5 Western (1 by Russian authors).

UDC 591.089.84:612

Changes in Recipient Brain Neurons Around Embryonal Nerve Tissue Transplantate

18402082 Moscow ONTOGENEZ in Russian Vol 20 No 2, Mar-Apr 89 (manuscript received 6 Jul 87) pp 216-220

[Article by V. N. Kleshchinov, Institute of General Genetics, USSR Academy of Sciences, Moscow]

[Abstract] The goal of this study was to investigate the ultrastructure of mature neurons of recipient brain tissue that are localized around a developing transplantate of embryonal nerve tissue (ENT). The work was done on male Wistar rats; the embryonal nerve tissue was taken from 17-day-old embryos of the same line of rats. Four days after the ENT was transplanted in the sensorimotor cortex of the test animal's right hemisphere, edema was

noted in the recipient's neuron tissue near the transplanted, with an almost total absence of hyperchromic and shriveled neurons; the nerve cells were slightly swollen and the round nuclei were rather light. Other changes observed included the dispersion and nearly total absence of granular endoplasmic reticulum, the appearance of small mitochondria and disappearance of the large ones, the presence of a large number of free polysomea, the marked clearing of nuclei, and the presence of large nucleoli. Thus it was shown that transplantation of ENT into adult animal brain did not result in any destructive processes in the nerve cells, and even led to partial dedifferentiation of such highly differentiated cells as the giant pyramidal neurons (Betz cells) of the fifth layer of the sensorimotor cortex. Figures 2; references 17: 12 Russian, 5 Western.

UDC 612.46.06:[612.766.1+613.863

Effect of Intensive Exercise on Functional State of Kidneys

18402083 Moscow *UROLOGIYA I NEFROLOGIYA*
in Russian No 2, Mar-Apr 89 (manuscript received
30 Aug 88) pp 3-7

[Article by Yu. N. Bukayev, B. S. Gusev (deceased), A. F. Darenkov, T. I. Makarova and N. N. Vladimirova,

Division of Radiology, Scientific Research Institute of Urology, RSFSR Ministry of Health, Moscow]

[Abstract] The goal of this study was to determine the extent of kidney function disorders resulting from muscular exercises of different duration and intensity. Radioisotope renography and nephroscintigraphy using ^{131}I -hippuran were employed. In all, 64 professional athletes aged 17-26 years were studied. The characteristics of the ^{131}I -hippuran kinetics through the urinary tract during rest and after a exercise on a bicycle ergometer were determined in 14 of the 64. Serving as the model for the studying the effects of "chronic" exercise were the remaining 50 men, who had not performed regular exercise for five days to one year. A direct relationship was noted between the renal blood flow and the extent of muscular exertion. After isolated single exercise, the observed renal changes disappeared without any traces. In contrast, repeated, long-term muscular stress led to development of irreversible functional changes, even after considerable rest periods. A conclusion was reached that the principal mechanism leading to these changes was the hemodynamic adaptation reaction of the body to physical exertion and not a compensatory mechanism. Figures 3; references 9: 1 Russian, 8 Western.

UDC 614.252.3

Several Aspects of the Activity of the Medical Cooperatives

907C 0413A Moscow ZDRAVOOKHRANENIYE
ROSSIYSKOY FEDERATSII in Russian No 10, Oct 89
pp 33-37

[Article by Yu. S. Sidorenko, Rostov Oncology Research Institute, RSFSR Ministry of Public Health]

[Text] The structure of the state system of national public health care still reflects the idea of society as a kind of homogeneous mass with averaged tendencies, attitudes, and deterministic behavior. The sociological studies carried out in the past 3 years have smashed the stereotype of the old way of thinking about a homogeneous society, revealing numerous groups and contingents of citizens with different psychological attitudes and modes of behavior. Important in the analysis is the fact that there exist groups of the population who in principle do not wish to avail themselves of free medical services. These people are convinced that a paid medical service is more effective. They do not want to be obligated to anyone, not even society or the state. The patients from this group of the population stubbornly and persistently seek out a way of paying a confidentially chosen specialist for medical attention. Such attitudes and behavior, projected onto the existing state system of public health, constitute certain difficulties and conflicts.

Legal guidance of this stream of patients into the channel of cooperative medicine might remove tension on the level of the nationwide public health service. Presumably, as the prosperity of the population increases, the specific share of this group (which even today may be gauged by sociological investigation) will probably grow.

At the same time, aside from the cooperative medicine "volunteers," experience shows that there exists a group of "compulsory" cooperative patients. This is comprised of those who have an internal acceptance of free medical services, as well as those patients who are experiencing financial difficulties and would gladly be examined, observed, and treated in the system of nationwide public health. They come to the cooperative out of necessity, being unable to obtain what they require in the conditions of the regional polyclinic.

USSR Ministry of Public Health edict No. 785, so widely promulgated and inspiring such response within the society, reflected the contradictory situation in which the medical cooperatives find themselves with respect to lease arrangements. Like any decision that does not propose economic strategies, the edict left many problems unsolved and raised new ones. Many of the medical cooperatives shut down, while others tried to get around the difficulty. For example, the "Diagnostika" cooperative of Moscow refused to lease premises and equipment from one of the hospitals and formed a "joint venture,"

the members of the cooperative becoming co-owners, as it were, of the hospital property.

The appearance of the aforesaid edict came on the heels of an analysis of the activity of the medical cooperatives, which brought to light a number of negative features. It clarified the problem of mutual estrangement of the state and the cooperative systems of medical services, which are fundamental in nature.

Wishing to take part in the debate forming around the status of cooperative medicine in our country, we consider it essential to stress several initial points. The chief deficiency, in our opinion, of the incipient cooperative movement is the fact that the cooperatives themselves lie outside all societal supervision. Such statement, however, is an affront to all who have become weary with the many years of bureaucratic management and have suffered in some way from its costs. Closer examination of the issue of lack of supervision of our cooperative medical movement reveals the vitally important fact that social supervision of the activity of the physician is not less, but greater, in a system of private medical practice.

Supervision of the physician's activity is also inadequate within the state-operated medical service, being of a formal, halfway type. It is carried out by the organizers of the public health service, primarily with respect to a set of indicators.

In the realm of private medical practice of the Western type, there is an all-embracing and many-factor check on the end results of the medical services, in which the users of the latter have a real involvement—if need be, the patients may bring legal suits to redress the harm done them.

Thus, in both the state-operated and the private medical practice, there is a check on the activity of the physician, being fundamentally different, yet existing nonetheless.

A preliminary analysis of the activity of the medical cooperatives in our country has shown that the latter are entirely removed from any form of supervision, since by virtue of their status they do not take the cases to their conclusion and are not responsible for the outcome of the diagnosis or treatment. The cooperatives merely pose the problem for the state-run medical service, at the same time passing off all liability to it. In the conditions of the state-run system of public health, the members of a cooperative evade all "market type" controls, while on the basis of the Law of Cooperatives they are also free of official state controls.

A version of the "market type" controls could become a decisive factor only in the event that the final results are obtained on the level of the cooperatives. But this would require creation of a cooperative system that brings together not only the diagnostic polyclinics, but also the treatment centers, the organizations and enterprises for medical equipment, and also the medical industry.

The process of training of the personnel who work at the medical cooperatives is also unchecked. Are we not encroaching in this matter on the principle of free formation of their workforce? Consider the experience of the private medical practice, where every graduate of a medical college by no means receives a license to set up an independent practice at once. Thus, a physician with a diploma must still work for 5 to 7 years not independently, but under the supervision of experienced specialists, and only after this is he entitled to take the examination for a particular certification. Physicians arriving from other countries in the United States, for example, in order to obtain the particular certification are forced to take examinations that are so hard that only a few of the hundreds of applicants pass. Thus, in the setting of private medical practice, the choice is "free" only to the few (generally, specialists of very high caliber), which in fact constitutes a guarantee of the medical service to the patients. But we, being novices in the creation of non-governmental forms of services to the population, have omitted much in the legal documents: all who desire are permitted to work in the medical cooperatives.

Let us now take up the subject of the earnings of the members of the cooperative. The high level of this, several times greater than the salaries of medical technicians in the state-run system, has excited a bitter polemic in the press and in medical circles. The salary of a physician in the state-run public health system, as we know, depends on his tenure, his qualification category, and his academic degree. Only a few clinics, such as the MNTK "Microsurgery of the Eye," are using progressive methods of remuneration on the basis of the number of operations performed and patients cured. In reality, it turns out that specialists who are untried, who have been rejected, or who have been dismissed from the hospitals on account of retirement age, have become members of medical cooperatives earning many times more than their colleagues in the state medical institutions. Such situation objectively creates the soil for social tension in the sphere of the medical workers.

As shown above, there is today an organic disassociation between the state-run and the cooperative sectors of the health service, which is all the more unacceptable. No form of societal controls has been found on the work force and professional stature of the members of the medical cooperatives, who work as though in a "free market" environment, yet do not pay for their mistakes. There is a great disparity between the earnings of a doctor in a state-run medical institution and one in a cooperative, which brings about tension and dissatisfaction in the ranks of the physicians, places in doubt the ideals of social justice, and is fraught with unforeseen consequences.

Nevertheless, we are convinced that medical cooperatives are an extremely important and promising trend that can solve those problems which are not being handled by the existing system of public health care. This includes, first and foremost, the low level of intensification of labor.

The extensive path of development of the public health service in recent decades has marshaled the world's largest army of doctors and medium-level medical workers, and at the same time has brought about a chronic underutilization of expensive diagnostic apparatus. The latter is essentially "alienated" from both the worker in the state-run institution and the member of the cooperative: in the state-run sector, it is "on the balance sheet," while in the cooperative sector, it "belongs to the state."

The next unresolved problem in the state public health service is the poor efficiency, the slowness of movement, the clumsy management, which prevents the executives from responding to the immediate situation. It often becomes necessary to organize a second shift of medical work, to increase the equipment workload drastically, to bring in the required specialists for temporary or permanent employment beyond the strictures of the wage fund, to acquire the necessary instruments and equipment beyond the funds allocated from above and outside of the plans, and so on.

One other circumstance not always to the benefit of the patient but so far unavoidable is the "regionalization" of medicine, which prevents a patient from seeing another specialist outside his region without special dispensation, or from being examined at a convenient time, such as after work or on his days off.

A factor holding back the increase in intensity of medical care is not only the limit on doctors' wage rates and the range of additional services in the budget, but also the article of the Labor Law which sets a limit of 1.5 wage rates on persons holding more than one job.

In view of the above difficulties in the functioning of our public health service, the cooperative form is necessary for a conscious solution to the mentioned problems. Under these circumstances, a form of medical cooperative that organically combines the state and the cooperative sector in medicine would seem constructive: the production-cooperative association. Such form is in full conformity with the resolution of the USSR Council of Ministers of 29 Dec 1988, "On the regulation of individual kinds of activity of cooperatives in accordance with the USSR Law 'On Cooperatives in the USSR.'"

The creation of a production-cooperative association entails the following points. The cooperative is formed primarily from competent members of a state-run medical institution and is situated on the premises of the latter. Its place in the system being mainly to provide diagnosis, the cooperative sends those patients requiring treatment to the parent institution, thus providing an integrated diagnosis and treatment process. The available equipment, leased for use during the second or even the third shift and on days off, is used judiciously and profitably.

During the initial period of organization of production-cooperative associations, it is important to determine accurately the list of parent medical institutions having

the necessary finances, equipment, and authoritative specialists. These will be, most likely, the oblast clinical hospitals, the polyclinics and clinics of educational and scientific research institutes, and so forth. As the medical cooperative movement advances, the range of parent medical institutions may be widened.

Membership in a medical cooperative should be determined after consideration and interviewing of each candidate by the medical council of the hospital or scientific council of the institute, i. e., by those collegial organizations that are ultimately responsible for the professional activity in the cooperative being formed. A review of the candidacies should be made each year, taking into account the professional activity in the state-run institution and cooperative. The preference should be given to those with no less than 10 years tenure and qualification category I or higher.

We believe that an important and critical matter is the democratic procedure of electing the chairman of the cooperative and the other functionaries. Until recently, this process has not been democratic in nature: the initiator of a cooperative being newly formed would automatically consider himself to be its chairman, and after registering it at the executive committee he would set about forming the work force. It seems advisable to elect the chairman of the cooperative at a general meeting of the members by means of direct voting. It should be possible to bring in a chairman from the outside, should the members desire, but only after coordinating the matter with the scientific council of the institute or the medical council of the medical institution on whose premises the cooperative is set up.

In the time free from their main employment, the members of the cooperative should be entitled to use the medical equipment, as well as the necessary medications, for diagnosis and treatment of patients. Items in scarce supply should be used as a first priority during the first shift, i. e., for the free health care.

We propose that the financial affairs of the medical cooperative be handled as follows. The monthly income ceiling for each member of the cooperative is the level of the salary which he receives in the state-run institution; half of the money actually earned is paid out, but not more than the wage rate. The remainder of the money earned is entered in the account of the parent institution in its financial and equipment development fund, which serves the interests of both the state and the cooperative sectors. At the end of the year, each member of the cooperative may be paid additional premiums, amounting to 25% of the sum remaining in the personal account of the member after the monthly payments. Such arrangement should be an incentive to the member in receiving a kind of "above-quota income."

An important clinical aspect of the operation of this model of association is that a person availing himself of the services of the cooperative will receive treatment at the very same treatment locality or be sent to any other

medical institution by the generally accepted scheme for the particular diagnosis or treatment.

In conclusion, we should take up one other aspect of the activity of the medical cooperatives—the forms of offering charity in respect of the group of the population with meager income. For this, the cooperatives should organize free "open receptions." As shown by the many years of experience with these at the Rostov Oncology Institute, the contingent for the "open receptions" is formed over a duration of two weeks. Thus, a free "open reception" in the cooperative twice a month would fully handle this problem. Furthermore, such kind of activity would bolster the social status of the cooperative.

Of course, the free reception in the cooperative should enjoy the acclaim of society and be duly publicized by the organs of the mass media. And not only the free reception, but all of the other activity of the cooperatives should be analyzed by physicians, people's deputies, Party and Soviet workers, and the ordinary citizens making use of their services. This is especially important today, since the cooperative movement will not be easy and simple to set up. Not only the doctors and the patients, but all of the population should little by little come to understand and accept each other, deftly avoiding extremism and emotionalism from any quarter and concentrating their attention and efforts on developing the most constructive and effective work methods.

We feel that the proposed model based on a harmonic combination of personal and societal interests will help raise the quality of medical care of the population, making the existing health care system more effective and flexible. This will grant the additional possibility of strengthening the financial and equipment base of the medical institutions.

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Novel Method of Managing, Planning, and Financing Medical Service

18400441 Moscow *EKONOMICHESKAYA GAZETA*
in Russian No 14, Mar 89 p 17

[Article by Vladimir Ilich Shevskiy, Deputy Director for Economics, Kuybyshev Oblast Health Department, under the rubric "Economics and Health Care": "Polyclinic Pay Hospital Bill: Finances and Health Closely Linked in Experiment in Kuybyshev Oblast"]

[Abstract] A novel method of administration, planning and financing of medical service is being used in the Kuybyshev oblast. The prevalent practice of treating a disease rather than the patient has been challenged; a number of specialists may treat a patient, but no one takes responsibility for the overall health of the patient. The problem is due in part to the system used in financing public health: the hospitals and polyclinics are paid by the number of beds, not patients, treated, so the hospitals grow and the polyclinics, where 80% of the patients are treated, become poorer. To correct this

situation, 60 independent polyclinics, 30 dispensaries, and 16 stomatological polyclinics have been reorganized within the framework of 46 territorial medical associations (TMA). Finances are allocated to the polyclinics based on the number of people in the area (an average of 55 rubles per person per year, plus construction and equipment monies). The money for staff salaries is based on 75 kopeks per ruble allocated to polyclinics and 50 kopeks to the hospitals. Polyclinics must procure and pay for the required services from hospitals, laboratories, ambulance services, etc. Costs have been standardized. High productivity is rewarded from central reserves as bonuses for procurement of medications, equipment, etc. In addition to officially budgeted funds, each TMA sets up contracts with local industry for on-site treatment centers from which both parties benefit. Some statistics: infant mortality has decreased, TB incidence has dropped, hospital stays have been reduced.

Medical Institute Department Head Discusses Drug Shortage

18400577 Moscow PRAVDA in Russian 13 Jul 89 p 3

[Interview by PRAVDA correspondent with Pavel Vasilyevich Sergeyev, head of the molecular pharmacology and radiobiology department of the Second Moscow Medical Institute imeni N. I. Pirogov, RSFSR State Prize winner, corresponding member of Academy of Medical Sciences, under the rubric "Timely Interview": "The Drug Shortage—Whose Fault Is It?"]

[Abstract] In this interview, P. V. Sergeyev, head of the Department of Molecular Pharmacology and Radiobiology of the Second Moscow Medical Institute, discusses the shortage of drugs in the Soviet Union. He notes that there is no countrywide system for the production and introduction of medications and that many pharmaceutical enterprises lag by decades behind today's standards in terms of equipment. The equipment is always breaking down, and the ecology constantly suffers, requiring the closing of factories. The catastrophic shortage became particularly acute after the decision was made to merge the medical and microbiological industries. The decision left the Ministry of Health with no say in the matter of manufacturing drugs. Increasing prices is a partial solution, since many medications must now be sold for less than the cost of their ingredients. Another problem is the shortage of pharmacists. For many years, the Soviet Union has graduated many more doctors than pharmacists. Sergeyev suggests that his department be used to create a biomedical teaching and science center for all CEMA member nations, inviting professors from foreign institutes and universities to teach there, including individuals from the capitalist countries. The first step in eliminating the drug shortage, however, has been performed—the inventory of what is actually available, what is obsolete, and what is unavailable throughout the country. The next step will be to develop a long-term state plan for the production and introduction of medications.

Physicians Oppose Anonymous Venereal Disease Testing

18400578 Moscow K MOSOMOLSKAYA PRAVDA in Russian 11 Jul 89 p 4

[Article by Yu. Skripkin, USSR Academy of Medical Sciences member and director of the Central Skin and Venereal Disease Institute, and ten other, unnamed doctors of science, under the rubric "After Our Speeches": "INTIM: With the Publication of An Article of the Same Name Came Hundreds of Letters, Among Them This Official Reply"]

[Abstract] This letter to the editor states that neither administrative processes nor public vote should decide issues such as whether there should be mass health screening or whether anonymous testing or treatment should be done, as they are questions to be decided by specialists. Venereal diseases—diseases that are capable of spreading, but, unlike many other infectious diseases, often go unnoticed in the individual—are countered not only by antiepidemic work done in the disease focus, but also by mass health screening, which includes preventive examinations of various groups of the population, including blood donors, pregnant women, workers in children's institutions, patients in general hospitals, and risk groups. In fact, Skripkin says, the mass health screening method is the most effective method of combatting venereal disease, is the pride of Soviet health care, and is the envy of venereal disease specialists abroad. Skripkin says the anonymous examination and treatment of venereal disease patients proposed by the chief physician of the Moscow City Skin and Venereal Disease Dispensary is not a viable alternative to mass health screening and will simply destroy it, since even the chief physician's data indicate that 30% of the individuals who test positive for syphilis do not return for treatment, and the same is true for more than 50% who are diagnosed as having gonorrhea. The drawbacks of anonymous testing, Skripkin says, outweigh the benefits.

UDC 616-089(470.41)

Surgical Care and Means of Improving It in Tatar ASSR

18402058a Kazan KAZANSKIY MEDITSINSKIY ZHURNAL in Russian Vol 70 No 1, 89 pp 1-4

[Article by M. Yu. Rozengarten and L. D. Semenova, Kazan]

[Abstract] At the present time there are some 75 medical centers in the Tatar ASSR offering surgical services, and a ratio of 3.6 surgeons and 18.9 surgical beds per 10,000 of population (vs. 2.95 and 16.8, respectively, in 1978). In the 1978-1987 decade 1,293,132 surgical procedures were performed in Tataria with a postoperative mortality of 0.93%. Careful statistical analysis has shown that in the past 4-5 years the postoperative mortality has stabilized after a period of reduction, if not actually shown a slight reversal. The latter disconcerting trend is

largely attributable to late presentation of patients for surgical treatment, showing that considerably more effort needs to be expended on health education of the population. In addition, it has also come to light that many of the surgical services are in need of updating and that surgeons and supportive staff need to be monitored for professional competence. Finally, a serious matter that demands rectification is the lack of specialized services dealing with orthopedics, bone tumors, and pediatric oncology.

UDC 364.444:[364-053.2+364.65-055.26]

Protecting Maternal and Child Health: Problems and Ways of Solving Them

18402061a Moscow SOVETSKOYE
ZDRAVOOKHRANENIYE in Russian No 3, 89
(manuscript received 5 Nov 88) pp 3-6

[Article by A. A. Baranov, USSR Ministry of Health, Moscow]

[Abstract] Among the developing and developed countries the USSR occupies an intermediate position in terms of child and maternal mortality, with respective figures of 25.4 and 0.48 per 1000 live births in 1987. This situation prevails because of the unequal regional distribution of health care resources. As a result, the mortality figures for children under 1 year of age ranges from 11.3 per thousand live births in Lithuania, to 50-70 in Uzbekistan, Tajikistan, and Turkmenistan. Analysis of this situation has led to the conclusion that in addition to adding medical personnel, distributing them equitably, and enhancing existing health facilities, more novel measures must also be implemented to make perestroika meaningful. The latter would include the creation of a network of health centers geared toward the target population in high-risk areas, operating on a convenient outpatient basis.

USSR State Agroindustry and Nitrates in the Environment

18402063 Moscow ZDOROVYE in Russian
No 2, 89 p 6

[Article by V. S. Murakhovskiy, chairman, USSR State Agricultural Industry]

[Abstract] An article in the No 10, 1988, issue of ZDOROVYE implied that the Soviet agroindustrial complex is lax in controlling environmental nitrates in the food cycle and in nitrate pollution of soil and water. However, Murakhovskiy says that the article, while justly emphasizing the health risk that the nitrates pose, did not address the fact that nitrates are a necessary evil in maintaining soil fertility and in assuring adequate levels of high-quality crops. Nor was there due recognition accorded to the fact that all levels of the agricultural establishment have taken their responsibilities seriously vis-a-vis environmental health by modifying and

improving agricultural technologies. For example, biological pest control is now practiced on about a quarter of the land area in agricultural use; eventually, biological control methods shall entirely supplant purely chemical methods. The use of nitrate fertilizers has been further refined and is under close control to ensure that proper dosages and forms are used for optimum crop production. To date, 1,419 special chemical technology laboratories have been established at the rayon level to facilitate chemical monitoring, with the number of such laboratories anticipated to reach 2,059 by 1990. In addition, plans have also been made for greater involvement of the medical health services and their laboratories for monitoring food safety and health risk factors incidental to the use of chemicals in agriculture. The Soviet agricultural complex has been and shall continue to be vigilant in combining productivity with concern for the environment and health.

Joint Venture to Produce Disposable Syringes in Tashkent

18402094 Moscow MEDITSINSKAYA GAZETA
in Russian 7 Jun 89 p 4

[Article by G. Kryuk, lead engineer of the joint venture Sovplastital, and MEDITSINSKAYA GAZETA correspondent V. Zhuravlev: "The Disposable Syringe—300 Million per Year"; first paragraph is source introduction]

[Text] Starting in the first quarter of the coming year, the Soviet-Italian joint venture for manufacture of plastic consumer goods and souvenirs, Sovplastital, will begin producing 300 million disposable syringes per year in Tashkent.

The syringe—that most rudimentary of medical implements—has recently become a kind of index of the level of development of medicine in various countries of the world. Unfortunately, we have long been in the wake of technical progress in this area. The efforts to develop and introduce into medical practice Soviet-made disposable syringes have thus far been unsuccessful. Licensing deals, barely set in motion, would be slowed and reduced to naught by "studies" and "arguments" in the impenetrable offices of the agencies and ministries. The purchase of large lots of syringes abroad, as pointed out at the April (1989) plenum of the CPSU Central Committee, was simply bungled.

The current need of the country is two billion disposable syringes. Yet the Ministry of Medical and Biological Industry plans to produce 150 million of them this year. A drop in the bucket. That is why the step taken by the joint venture in Tashkent is so crucial to the health care sector of the country. Utilizing its status and rather strong ties with Western suppliers, Sovplastital concluded a contract with one of the Italian companies to deliver and install in Tashkent a modern, computer-controlled, automated production line for such syringes, with an output of 300 million pieces per year. For comparison, let us note that one of the largest

companies of Europe, MAP (Italy), produces 500 million plastic syringes per year. Thus, in terms of volume of production, the enterprise in the capital of Uzbekistan will take its place alongside the leading Western producers.

Tashkent is taking a certain commercial risk. The deadlines for startup of the unique enterprise, consisting of a multitude of subdivisions and services, are extremely tight. Each of the machines making up the enormous line is unique in its own right and requires extremely intricate servicing. Even the purity of the air in the assembly and warehousing areas and the laboratory buildings must comply with all the WHO standards.

The Council of Ministers of the republic, in view of the urgency of the planned production, has adopted a special regulation to hasten the organization of production.

An additional six million nonexchangeable rubles will be transferred to the account of Sovplastital at the Foreign Economic Bank.

UDC 614.27

Analysis of Labor and Staff Resources of Pharmaceutical Service

18402109 Minsk ZDRAVOOKHRANENIYE
BELORUSSII in Russian No 3 Mar 89 (manuscript
received 5 May 88) pp 28-31

[Article by V. F. Gorenkov, Department of Organization and Economics of Pharmacy, Belorussian Institute of Advanced Training for Physicians]

[Abstract] The state of the country's pharmaceutical service and that of specific regions during the 1980-1985 period in terms of material and manpower were studied. In general, the study period showed a general improvement over previous years. At the country level, 90.5% of the expected service was provided to the population; the Ukraine, Belorussia, Kazakhstan, and Latvia exceeded the standards set for the country. Work and business space for the pharmacies increased. Storage space was at a level of 40% of the expected norm. The manpower was at 95.4% of the standards set, with a fivefold variance among republics, a threefold variance among the urban population, and a tenfold variance among the rural population in terms of druggists. There is a shortage of about 58,000 of druggists countrywide. In 1985 there were 152.1 pharmacy employees per 100,000 population (an 8.2% increase over the eleventh five-year plan), and the budget reached 3,647,000 rubles per million population (a 32.6% increase). References: 10 (Russian).

UDC 616-084.3.003.1

Medical and Cost Effectiveness of KASMON System

18402114B Moscow ZDRAVOOKHRANENIYE
ROSSIYSKOY FEDERATSII in Russian No 4, 1989
(manuscript received 19 Apr 88) pp 14-18

[Article by G. S. Popov, S. L. Solomonov and L. F. Yablonskaya, Riga Medical Institute]

[Abstract] Comparative analysis was conducted on the effectiveness of the KASMON diagnostic system in mass screening vis-a-vis results obtained by a team of three clinicians. The trial, conducted at the No 7 Polyclinic in Riga, encompassed a total of 400 male and female subjects, 30-49 years old, divided equally between the two study groups. The results showed that while the clinical team uncovered 171 disease entities, the KASMON approach displayed a twofold greater detection rate, with diagnosis of 347 individual pathologies. Furthermore, analysis of cost factors demonstrated that the cost of screening one patient by the clinical team was 10.46 rubles, while the cost of the KASMON system was only 3.21 rubles per patient. Both the clinical results and the cost factor point to the applicability of the KASMON system in the Soviet mass screening program.

UDC 614.2:616-053.9-07

Computerized Database of Clinical and Sociological Observations in Gerontology

18402114C Moscow ZDRAVOOKHRANENIYE
ROSSIYSKOY FEDERATSII in Russian No 4, 1989
(manuscript received 24 Jan 88) pp 31-34

[Article by A. V. Tokar and Yu. V. Pakin, Institute of Gerontology, USSR Academy of Medical Sciences, Kiev]

[Abstract] Description is provided of a database designed for gerontological research which combines clinical and sociological information. The database, which can be maintained with SM microcomputer, consists of eight files. The 'Patient' file contains basic information (e.g., name, sex, age, etc.) as well as certain biological markers (blood group, rhesus factor), birth date, diseases, etc. The 'SAN' file (sociological data, anamnesis) contains retrospective and current information on education, nutrition, surgical interventions, living conditions, family situation, and so forth. Additional self-explanatory files deal with current address, occupational information, retirement situation. Finally, an 'Exitus' file encompasses information on the cause of death. A database of this nature is expected to have extensive application in epidemiological and medico-geographical studies. References 10 (Russian).

Maternal, Infant Health in Turkmen SSR

18402164b Moscow MEDITSINSKAYA GAZETA
in Russian 12 Jul 89 p 1

[Article by G. Olshanskiy, G. Osadchiy and K. Martynov, authorized physicians of the Soviet Children's Fund imeni V. I. Lenin and chief specialists, USSR Ministry of Health, Ashkhabad, under the rubric "Seeing is Believing": "Without Compromise"]

[Abstract] Three years ago a special commission issued a highly critical report on the state of maternal and infant health care in Turkmenia. Despite an increase in the number of physicians, nurses, and other medical personnel assigned to these services, and the construction of additional health facilities in the intervening period of time, the situation has not improved. Today, as before, infant mortality in the Turkmen SSR is twice as high as the national average, and medical evidence indicates that two-thirds of the deaths of pregnant women were preventable. Irresponsibility, lack of commitment, indifference, and incompetence on the part of the medical personnel, in combination with mismanagement, are the key factors underlying the ongoing deterioration of maternal and infant health. In certain cases there was falsification of medical statistics. This situation resulted in the Central Committee Communist Party of the Turkmen SSR assuming direct oversight over this branch of medical care in the republic in order to combat bureaucratism and promote maternal and infant health care.

Kirghiz Public Health Status

18402164d Moscow MEDITSINSKAYA GAZETA
in Russian 14 Jul 89 p 1

[Article by A. Prokin, MEDITSINSKAYA GAZETA correspondent, Frunze: "We Can't Wait Any Longer: Comments from the Party-Economic Aktiv of Kirghizia Devoted to Health Care Issues"]

[Abstract] Health status indicators continue to deteriorate in the Kirghiz SSR. Infant mortality is 1.5-fold

higher than the national average, the incidence of tuberculosis is 20% higher, morbidity due to infectious diseases is three- to four-fold higher, and the incidence of diabetes, cardiovascular diseases, and gastrointestinal disorders increased by 8-10% over the previous year. Incompetence and indifference on the part of the medical personnel appear to be the key factors responsible for this situation in Kirghizia. However, mismanagement is also evident in the fact that 17% of the hospitals and clinics lack running water, half of them lack sanitary plumbing facilities, and the majority do not have hot water. These are serious concerns that demand immediate action on the part of Soviet and Kirghiz government and party authorities.

Medical Transport Problems in Turkmen SSR

18402165a Moscow MEDITSINSKAYA GAZETA
in Russian 7 Jul 89 p 3

[Article by V. Zhuravlev, Meditsinskaya Gazeta correspondent, Serakhskiy Rayon, Turkmen SSR, under the rubric "We're Studying the Problem": "Beneath the White Sun of the Karakumy"]

[Abstract] Implementation of the national mass screening program and routine medical care of the nomadic shepherd families and remote settlements in the Turkmen SSR is complicated by the unsatisfactory state of medical transport. Ambulatory health services are poorly organized and shortage of gasoline limits the mobile medical teams to one or two excursions a month from a rayon center to settlements 80 to 100 kilometers from the center. For the rest of the month the mobile clinics remain in the garage. In addition, shortage of the most rudimentary medical equipment and supplies has a serious adverse impact on the quality of care than can be offered. For example, lack of refrigerators makes it virtually impossible to maintain and stock heat-sensitive medicinal preparations and drugs in a hot climate. The Turkmen SSR Ministry of Health is well aware of the problems in health care delivery and it is hoped that the impetus provided by perestroika will overcome the neglect and inertness that have thus far characterized health services in Turkmenia.

Extrasensory Perception Research at Electronics Institute*18400549 Moscow IZVESTIYA in Russian
10 Jul 89 p 4*

[Article by V. Konovalov, IZVESTIYA science reviewer: "Problem: Psychics and Science"]

[Text] Psychic Takhir Saleyev slowly moves his hand along the body lying on the couch and names, one after the other, the "sore spots." This is the first examination session—in which the psychic is working in a diagnostic mode. Then, during the course of therapy, he will perform noncontact massage with his "warm" hands. Saleyev treats various diseases and, evidently, rather effectively, since the line in his massage office is always growing. He is becoming the wonder of Tashkent. But virtually every city has its own popular psychic. As might be expected, the persecutions, bans, and abuse in the newspapers have had the opposite effect—an increase in the popularity of "magicians."

The persistence of Takhir Saleyev's desire to use his natural abilities for the good of others struck me. Unlike many psychics, Takhir Saleyev is a person with a university education. He graduated from Samarkand State University and worked as a translator. Then, sensing a new calling at the age of 42, he decided to obtain a medical education. This year he completed the evening division of medical school with distinction and is getting ready to enter the medical institute.

The times have changed. Like other psychics, Saleyev is no longer subjected to persecution. Lessons by psychics are broadcast on television. Various clinics throughout the country are beginning to use them to some degree or other. They are still wonders. But at this point, wonders who are not all that uncommon. Saleyev dreams of a large salon opening in Tashkent with all types of massage. He dreams of special schools where gifted children would be prepared for a vocation in medicine. And I think that his dreams will be realized because science is now beginning to move to a new medicine, and delicate sensory effects on the controlling system of the human body will probably be at its "core."

Not long ago at a meeting of the presidium of the USSR Academy of Sciences, Academician G. I. Marchuk announced that attention toward the phenomenon of psychics has facilitated the birth of a new scientific direction. He said that in his time, when high-ranking individuals began to resort to the services of psychics, Yu. V. Andropov asked the USSR Academy of Sciences to clarify whether there was a rational, useful "kernel" in the actions of the psychics. The situation was clarified when a group of scholars headed by Yu. V. Gulyayev, the current director of the Radio Engineering Institute of the USSR Academy of Sciences and academician, and by E. E. Godik, a professor, began working on the matter. They explained that there is no mysticism in the actions of psychics—it has to do with real physical fields that are known to science.

And then came the most interesting part—a study of the individual's own physical fields. Since they are generated during the process of vital activity, one can evaluate a person's condition from them. This has opened enormous prospects for objective diagnosis, and the diagnosis is absolutely harmless—no x-rays, chemicals, or unpleasant probes—it's done solely on the basis of the individual's natural emanations. The task was so fascinating and had such a large scale that physicists set the problem of psychics aside and began studying the emanation of emissions from the body and the brain of ordinary people.

Scholars from the Radio Engineering Institute approached the problem systematically. Not only were advanced methods of recording different human physical fields selected or created, but special computer programs for visualizing them were developed. No only was the ordinary appearance of a human being now visible to us, but also the "radiance" around him of various physical fields, which are generated by each of us absolutely unbeknownst to ourselves, "automatically," as it were, during the process of our vital activity. And even in the earliest of stages, joint work with medical personnel showed that the new methods can be useful in diagnosing a whole array of diseases, including very serious ones. A special temporary scientific collective called *Obraz* has now been formed to accelerate work in this direction.

The scholars from the Radio Engineering Institute performed a service in that they were the first to record the dynamic pattern of a human being's physical fields. Roughly speaking, "photographs" of the individual types of human emanations were taken before them, and they created a "movie" or color "television." Thanks to this it became possible to track in real time the connection between the physical fields being observed and the processes of vital activity.

"The method of computerized tomography, with active irradiation for studying patients, is widely known," says Academician Yu. V. Gulyayev. "But it only makes it possible to study the body's structure as an immobile formation. Dynamic mapping of a human being's own physical fields and emanations, on the other hand, makes it possible to obtain a live computer picture of the patient and to judge not only the arrangement, but also the functioning of the internal organs, including the brain. In essence, passive functional tomography has been born. The method has potentially colossal possibilities."

"Modern medicine," continues Professor E. E. Godik, "essentially identifies invalids. It 'notes' only pathology—the profound development of a disease. To put it in a driver's terms, it notes only breakdowns and pays no attention to the 'grinding noises' that precede them. Today's physician is like the auto mechanic who is interested in the expensive repair of a broken automobile rather than in inexpensive preventive maintenance. Our methods make it possible to identify deviations in the

body in the 'grinding' stage. In the future this will open the way toward mass examinations of people and early detection of disorders. The medicine of the future will switch from detecting sick persons to discovering the beginnings of an illness. And of course, treatment methods will probably change. Now, when a disease has gone pretty far, we're forced to use chemicals that are far from nontoxic, large amounts of physical medicine, and surgical intervention. In the early stages, it will be possible to affect those same receptors of the individual with weak, informational doses of various radiations to help the body return by itself to a state of equilibrium, i.e., to health. As a self-organizing system, the reserves of the individual are enormous. And all we have to do is figure out how and by what means we can exert an effect. Methods of visualizing the dynamics of a person's physical fields and emanations will make it possible to implement this type of sensory therapy in an interactive mode. The physician will see the results of an action with his or her own eyes. This will be therapy with immediate feedback."

The attentive reader will quickly note that the sketch of "interaction" with the patient painted by Professor E. E. Godik is reminiscent of what Takhir Saleyev and other psychics are already doing today. Indeed, with their "warm" hands, which emit infrared radiation, they first sound a patient and "make a diagnosis," after which they treat the patient (monitoring the reaction) with different forms of massage (including noncontact) that are nothing other than the exertion of a weak sensory effect. Indeed, our skin contains a huge number of receptors connected to the internal organs. And if the medicine of the future will probably switch over to this, then why not make wider use of psychics today?

The current popularity of psychics is, if you please, primarily explained by the public's dissatisfaction with official medicine. Physicians consider them charlatans because they do not fully understand the mechanism of the psychics' effect. This is not their fault, but it's rather a pity. Indeed, psychics cannot explain their abilities plainly. And those who do explain it present the primary ideas of physicists. But does this really interfere with verifying whether their actions have a therapeutic effect or not? There are well-developed methods for that—the ones that are used to check new drugs. The Ministry of Health knows them splendidly. And little is needed—rather than separate psychics from medicine, we should involve them in it and set up centers for checking their therapeutic abilities.

It must now be admitted that, in long ignoring the phenomenon of psychic abilities, scholars have demonstrated a lack of the main professional quality of researchers—elementary curiosity. It is time to correct this error. By studying psychics we will better understand what a human being is.

"The phenomenon of psychic abilities is a most interesting field of research," says Professor E. E. Godik. "Unfortunately, for a long time the problem was pushed

to the side, rather than studied. It was encased in an unpleasant shell that was repulsive to all serious scholars. The medical people and the physiologists threw it over the professional fence to physicists—we are dealing with fields unknown to physics, they said.

"But when we received a state order to study the problem, it quickly became clear that it is an interesting matter. In my view, psychic abilities are, from a medical standpoint, ultrasensitivity to the patient. Psychics are natural masters of sensory dialog with the patient. On the subconscious level, they catch the signs of certain deviations in the body's physical fields, and, accordingly, they exert an effect on the receptors of the skin, the vision, and the hearing. They may be compared to virtuoso pianists as they play on the 'keyboards' of the receptors, listening keenly to the melody being born and eliminating the dissonances. Neither they themselves nor science yet knows exactly how this happens. We have only begun to study this problem. In a new stage of research we must understand and decode the language in which the psychic conducts his dialog with the patient. This is a most difficult task, one that may be compared to studying a language without a teacher. The healers of the past—for example, our rural physicians—used methods for such a dialog with the patient. Traditional eastern medicine is based on this, and I am certain that the medicine of the future will master it, too."

Of course, the discussion of the work of the scholars of the Radio Engineering Institute at the USSR Academy of Sciences presidium concerned psychics to a only small extent, because, already the prospects that have been uncovered have enormous value, independent of the investigation of this phenomenon. A new area of science in the study of man is now being formulated, and it has been decided to intensify work in this field. Plans call for creating a science-and-engineering center of biomedical electronics at the Radio Engineering Institute and for including the institute's existing biomedical electronics departments and a special design bureau in it. This academic center will probably become the head organization in the country for conducting work on the problem of the dynamic mapping of the physical fields and emanations of human beings.

The next—and no less important—step is to organize a scientific procedures medical center in the Central Clinical Hospital of the USSR Academy of Sciences.

Its job will be, on the one hand, to determine the fields in which use of the new methods and technology will be most advantageous and, on the other hand, to test them on a sufficiently large number of patients so as to be able to give them a "start in life." Such a testing range is useful to academy science since it will help establish fundamentally new areas that are being "rejected" by our conservative health care system. It is also useful to scholars of the USSR Academy of Sciences because, thanks to it, they will receive the most advanced medical care.

The Radio Engineering Institute has already given over nearly its entire fifth floor to the polyclinic of the Central Clinical Hospital of the USSR Academy of Sciences. Here it is already possible to take magnetograms, study a person's infrared and radio-frequency emissions, and study the electrical fields of our body. Each of these "channels" of research is a most interesting scientific direction, and integrating them opens the possibility of creating rapid functional diagnosis, and then sensory therapy.

But before the new field can be established, the researchers must have at their disposal the best equipment that modern medicine has. And, of course, it is necessary to enlist highly skilled teams of physiologists and physicians. Unfortunately, the academy clinic is not yet able to boast of a high level in that regard.

And even if the problem of highly skilled personnel can be solved with the help of the physiology departments of the USSR Academy of Sciences and USSR Academy of Medical Sciences and by using the capabilities of the temporary scientific collective Obraz, there is, unfortunately, no money for advanced equipment. Professor E. E. Godik states, "We are looking for a Hammer." A rich foreign partner is needed for rapid development of the new scientific direction and for subsequent selling of the results in the world market. The usefulness and promise of the matter are obvious, and so they are therefore certain that they will find companions.

"For rapid mass production of the new equipment that is being created," says Yu. V. Gulyayev, "our defense enterprises could be involved on a wide scale. We would just have to see to it that the medical technology is considered a commodity for national consumption, which, in essence, it is."

Yes, by the will of fate, the preeminence in opening and establishing a new scientific field—the dynamic mapping of physical fields for diagnostic and therapeutic purposes—belongs to Soviet science. Now, whether the new methods and technology become the world's property thanks to the USSR or whether, one more time, we end up spending our money to buy Western equipment manufactured on the basis of our ideas depends solely on how we set things up. I would like to believe that perestroika will break once and for all that shameful trend. Establishing the new medicine should be helped in every way possible, because it is important for all of us. Then, in the world arena, we can exchange our high level of achievement in that field for the highest achievements of others.

In stagnant times, we had the slogan "There must be no stragglers!"—as a result of which everyone became a straggler. We must not follow the example of the stragglers. It is time to follow the example of the leaders and to help them in every way possible. Then we will move forward in everything.

Backwardness of Psychological Sciences

18400582 Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 18 Jun 89 p 3

[Interview with Yuriy Mikhaylovich Zabrodin, president of the Society of Psychologists of the USSR, by SOTSIALISTICHESKAYA INDUSTRIYA correspondent: "'I do not like...psychologists'"; first paragraph is source introduction]

[Text] The words in our headline, uttered by Nikolay Stavrogin, the hero of Dostoyevsky's novel "Demons", could be used to describe the attitude of our society toward this most crucial science of human nature. Let this fact suffice: the per capita ratio of those studying human nature is 100 times greater in the developed countries than in the USSR! Crushed in 1936, Soviet psychology is in no way capable of assuming its proper place in the life of the people and the society. How can this backwardness be overcome? Our correspondent, L. Skoptsov, talks about this with president of the Society of Psychologists of the USSR, Yu. Zabrodin.

Question: Could it be that the Soviet individual simply has no need for the services of a psychologist? And that the billions of dollars per year spent by Western society on research and services to the population are squandered because there is so much money?

Answer: We conducted a social experiment once. A large group of managers was asked to write down the characteristics of people well known to them. The finished descriptions were retyped, the last names were covered over, and the papers were handed out to their authors. They were asked to state who was being described. Fifty percent of the answers were wrong. Then the descriptions and the last names were switched around. The managers were asked to sign them, if they agreed with them: in 90 percent of the cases they signed without noticing the changes. You may ask, what useful information can be extracted from such descriptions? Yet, they are used as the basis for creating our staffs, for promoting people or, just the opposite, holding people back.

Today there are universal laments about how thoughtlessly wasteful we are in squandering our oil, timber, coal, nonferrous metals... Believe me, the most foolish losses our society is suffering are from squandering the human resource. And ignorance is not the only reason for this.

Question: Yuriy Mikhaylovich, many people rightfully see in such official descriptions a kind of loyalty test: he's "one of us" or he's "not one of us." But what might even the most precise and reliable psychological description offer to the individual and society?

Answer: Let me start with an example. If we are using, say, a certain component or machine, then obviously we try to find out, first of all, how it is designed and what its specifications are. No competent engineer would attempt to plug in any old device just anywhere. We first analyze the situation.

And people are much more complicated and delicate systems. And all people are different. Take the psychological personality parameter of sensitivity to social pressure. If a person is sensitive to this, under no circumstances should he be scolded: he will lose heart. Thus, we should spend more time encouraging him for his successes than punishing him for his failures. Another person, no matter how many times told of his mistakes—it's like water off a duck's back. Therefore, we need to make the system of responsibility more strict. And there are dozens of such parameters that are essential for dealing with a living, breathing individual.

Unfortunately, this psychological knowledge is at present a forbidden zone both to the individual himself and to those who are working with him. That is, one must manage without knowing who it is that is being managed. With such an approach, discord in the social system is simply unavoidable. Both sides are losing.

Of course, talented managers usually project their personal experience on this situation. They work by intuition. To be sure, experience and intuition are great things, but they are no substitute for exact knowledge.

And in general, relying on intuition frequently has a negative result. For example, say an excellent worker quits. The manager intuitively tries to find an exact replacement for him. The reason why is obvious: there won't be any problems with adaptation—socially, or professionally.

But in the long term, this is a very dangerous tendency for any organization. If you wish to have the same thing all the time, you are making the organization conservative, slowing down social development. And what do you do if the same kind of person cannot be found? The negative consequences of the "intuitive" approach are even greater then. In order to make a proper choice, as many people as possible are called in. A competition among applicants is created.

Question: For the position of director, for example? Or a prestigious college?

Answer: Oh yes. Just so. The college competition is the most vivid example of such approach. If you consider merely the superficial side of the matter, as is done at present, then there are no problems at all! But if we examine this problem from the inside, as a social problem, as a problem involving the formation of the individual in society, then it turns out that the situation of competitive selection is a disaster! We set up a competition of, say, ten for one. A thousand persons have applied. And these thousand are building some sort of future for themselves. But only a hundred are accepted. And nine hundred experience tragedy, a personal failure on their very first attempt. Yet no one cares about them. One, two, three such social crises in a person's life, and they lose interest in trying. They have no interest whatsoever. They begin to protect themselves against possible defeat, against personal failure. In choosing a few to be among the elite, we are creating

hordes of individuals with no initiative. Their range of interests is narrowed by their refusal to take an active part in the life of society. Are we—or any society—really desirous of creating those ninety percent of lost souls? Of carrying such a social burden?

And so, psychology today is in fact capable not only of offsetting the consequences of this social ignorance, but also of going much further. With the help of refined psychological methods, we can figure out what kind of people are needed and select exactly that number, without creating a commotion.

This is a specific task within a more general method—so-called social planning. Today, we are able to plan the entire career of an individual. In this way, we may help them avoid needless failures and frustrations. Since, by the way, there are failures that are necessary, the kind which strengthen a person.

Question: I guess such services would not be cheap. Our readers include many who are involved in business. It would be useful to give them an idea as to what they would have to spend for psychological services. So, how much would they cost?

Answer: A lot. For comparison: a university professor in the field of psychology in the USA receives around \$20,000 a year. But in industry he would receive \$60,000. There is a 1:3 difference in salaries. In the USSR, an hour of lecture by a professor costs the state up to 8 rubles. For a thorough psychological analysis of a single person, as many as 20 hours are needed. Thus, the work of a skilled psychologist with a single person would cost, at minimum, 160 rubles; or around 500, if there is no minimum. Naturally, a person could not afford to pay this. Alas, the incomes of our people are not the same as in America.

Furthermore, in the developed countries there is, at minimum, one practicing psychologist for every thousand inhabitants. If we want to enter the twenty-first century as normal people, we must have around 300,000 psychology specialists in the USSR. This is an entire professional sector. Like any other sector, it cannot make do with psychologists alone—it needs laboratory technicians, programmers, economists. The budget of this sector, according to our estimates, should be five or six billion rubles per year.

Tremendous sums. Even so, I am sure that our society, and our enterprises, and our people will go along with those expenditures. And they will reach that point faster, the sooner our economy moves to a competitive, market orientation. And then the Marxist truths which declare that the individual is in fact the real motive force behind everything taking place on earth will be easier to digest.

Again, a market economy will accelerate the technical progress in our country, too. The rapidly changing technologies and the quantum leaps—all of this will require an entirely different attitude toward the worker. Previously, it was possible to adapt the man to the slowly

changing machine technologies. But now, in the age of the computer and the microprocessor, equipment and technology must be adapted to the capabilities of the individual. It is here that the question arises, What are those capabilities, what does the individual want, and what can be done to improve his lot? We can't do without the psychologist here.

Finally, the technological might of man has grown a thousandfold. And the cost of a mistake has risen a millionfold. But no normal person wants to make a mistake. What are the causes of mistakes? These are, in essence, purely psychological matters.

Thus, it is very profitable to invest money in man, i. e., in practical, applied psychology. Many enterprises and even whole bureaucracies have grasped this fact. The defense and the power industries, first and foremost. They are prepared to pay tens of millions of rubles for research programs, for precise knowledge and recommendations. Because disasters of the Chernobyl type are thousands of times more costly. They are prepared to pay for the training and retraining of specialists in psychology.

But there aren't enough psychologists in our country, compared to their demand. The universities turn out around a thousand a year, principally for science and academia, but not for practical work with people. Therefore, many agencies prefer to buy, not experts, but computer hardware with the appropriate software. We are selling such science-intensive products. And it costs a lot, not only here, but also in the abroad.

The third source of our revenue comes from this—the export of psychological knowledge gained in the USSR. By the way, many of the items which have been discovered and developed in the sphere of aviation and space psychology are quite marketable.

I expect that the revenue from those three sources will be large enough to spend a portion of the earnings on, shall we say, philanthropic goals. That is, to create a psychological service that will be inexpensive and accessible to the population. Moreover, the coming transition to regional cost-accounting inspires optimism. After all, human planning and development are needed not only where people work and study, but also where they live. And as soon as the local soviets get some money of their own, they can't help but invest it in our psychological services. The regions could not develop normally without this.

Our estimates show that, with the help of regional funding, we will be able to lower the cost of psychological services to 5-20 rubles per person.

The only vexing thing is that all of this was obvious and known to us fifteen years ago. But we simply were not given a chance to develop psychological services. A ban was placed on economic activity of the Society of Psychologists, and the issue died on the vine. Today, we are seeing a revocation of that unreasonable ban, and in the

near future we shall begin to set up an extensive network of consultation offices and diagnostics centers. Both regional and sector-based.

Question: Yuriy Mikhaylovich, where should our readers, convinced of the importance of psychological services, send their practical proposals?

Answer: The Society of Psychologists of the USSR, Moscow, 129366, ul.[street] Yaroslavskaya, d. [No.] 13. Tel. 282-45-03.

Identification and Evaluation of Level of Development of Practical Thinking in Senior-Class Pupils

18402032a Moscow VOPROSY PSIKHOLOGII in Russian No 1, Jan-Feb 89 (manuscript received 15 Jun 87) pp 128-132

[Article by Ye. Ye. Yashchishin, Kiev Center for Occupational Counseling for Youth]]

[Abstract] A study was conducted on the level of practical thinking in 80 pupils in the 9th and 10th grades at the No 8 School in Kiev who were taking driver education with a view toward vocational guidance. The purpose was to assess orientation in a traffic situation, recognition of danger signals of a possible traffic accident, and avoidance decision-making and decision-implementation to avoid an accident within a given time frame. The video-based technique consisted of 8 practice sessions and 20 test sessions. Classification of the results on the basis of the outcome, i.e., whether timely and successful accident-avoidance measures were taken, showed that the level of practical thinking could readily be ranked as very high, high, average, and low. The profound disparity in the results, ranging in scale terms from 1 to 16, provided proof that the approach was valid in testing practical thinking and suitability for occupation as a driver. Figures 1; references 16 (Russian).

Measurement of Ability to Switch Attention in Sensorimotor Activity

18402032b Moscow VOPROSY PSIKHOLOGII in Russian No 1, Jan-Feb 89 (manuscript received 15 May 87) pp 132-136

[Article by V. I. Stepankiy and G. S. Prygin, Scientific Research Institute of General and Educational Psychology, USSR Academy of Pedagogical Sciences; State Pediatrics Institute, Naberezhnyye Chelny]]

[Abstract] Trials were conducted with a video hockey game as a psychological test for measurement of attention switching, in order to assess the sensorimotor component of mental activity rather than the intellectual component that is usually evaluated. The test conditions were designed to have the test subjects play against themselves, with the efficiency of switching evaluated in terms of goals scored and successful saves. The method was deemed successful in evaluating the efficiency of attention reorientation, with a statistically significant

difference evident between the attention switching index of a group of athletes and nonathletes. Figures 1; references 7: 6 Russian, 1 Western.

Interrelationship Between Microsaccades and Functional Units of Short-Term Memory

18402062 Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 14—PSIKHOLOGIYA in Russian No 1, Jan-Mar 89 (manuscript received 27 Nov 87) pp 16-29

[Article by Yu. B. Dormashev and V. Ya. Romanov, Psychology Faculty, Moscow State University]

[Abstract] Four subjects were employed in a study on the interrelationship between microsaccades and functional units of short-term memory, using recall of a series of numbers. The study was based on the hypothesis that the appearance of microsaccades against a background of physiological nystagmus and galvanic microneystagmus reflects structural characteristics of problem solving. Analysis of the error rates, intonation, and uncertainty parameters (e.g., pauses between recalled numbers) led to the conclusion that microsaccades are related to temporal recall parameters, while jerks in fixational optokinetic nystagmus are related to intonation parameters. Furthermore, uncertainty was accompanied by attenuation of microsaccades. Galvanic microneystagmus approximates either physiological nystagmus with weak stimulation (3 mA) or fixational optokinetic nystagmus

with stronger electrical stimulation (6 mA). It appears that comprehensive studies on the structural aspects of mnemonic activity should encompass all three forms of fixational eye movements. Figures 4; references 33: 17 Russian, 16 Western.

Influence of Individual Adaptation of Information System on Quality of Operator's Work

18400527 Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 10 No 1, Jan-Feb 89 pp 121-126

[Article by Yu. P. Yablonko, I. P. Shmyglevskiy, V. V. Korniyenko, Moscow]

[Abstract] A study is made of the effect of individual adaptation of a computer system on the effectiveness of the activity of the operator using the system to execute a complex dynamic process. A method is suggested for organizing an information frame for the computer display to facilitate individual adaptation and optimize perception of the information by the operator controlling the execution of a dynamic process. The use of an arbitrary data frame structure is demonstrated to produce a constant component in the number of operator errors independent of the amount of training. Individual adaptation of the computer system to the characteristics of the operator yields better results than simply training of the operator, without changing the information frame shown on the screen. Figures 4; References 3 (Russian).

UDC 614.876-084

The Range of Possibilities for Creation of Individual Protective Gear Against Gamma Radiation from Fission Products*18400608 Moscow GIGIYENA I SANITARIYA in Russian No 4, Apr 89 pp 61-62*

[Article by D. S. Goldshteyn, V. N. Klochkov, and V. I. Rubtsov, Institute of Biophysics, USSR Ministry of Health, Moscow]

[Text] During the performance of repairs, disassembly, and emergency repair work at the enterprises of the atomic industry and at nuclear electric power plants, the need may arise for the personnel to spend time in fields of gamma radiation that create a radiation dose rate above the allowable level for the human body. Accordingly, various organizations have made attempts from time to time to create protective garb made of material containing various quantities of lead. Such a technical solution is adopted by analogy with the individual protection gear (IPG) used in the servicing of X-ray equipment. However, no heed is given to the fact that the ratio of attenuation of gamma radiation by different materials is heavily dependent on the radiation energy. When working at the enterprises of the nuclear power industry, the largest contribution to the gamma radiation dose rate comes from such fission products as ^{95}Zr , ^{95}Nb , ^{103}Ru , ^{106}Ru , ^{131}I , ^{137}Cs , ^{140}Ba , and ^{140}La . Of the activation products, we must mention ^{22}Na , ^{24}Na , ^{60}Co , and ^{59}Fe . The energies of the main gamma lines of these radionuclides lie in the range of 0.3-1.6 MeV.¹

It is known that the efficiency of absorption of gamma radiation in materials grows as the atomic number Z of the material increases.² In the above noted energy range of photons, the absorption of gamma radiation in the material occurs mainly by virtue of two processes—the photoeffect and the Compton effect, the probability of which grows in proportion to Z^3 and Z , respectively.² We should emphasize that the efficiency of absorption of gamma radiation by a substance does not depend on its chemical form or physical state, but is determined solely by the content of chemical elements in its composition, i.e., any given chemical compound will attenuate gamma radiation exactly as much as the mixture of atoms of the elements making up its constitution.

The available data as to the ratio of attenuation of the gamma radiation dose rate by various materials make it possible to estimate the minimum thickness of protective material needed to afford the necessary protection factor. Thus, the data presented in the handbook written by Mashkovich³ indicate that, at a photon energy level of 0.3 MeV, a twofold attenuation of the gamma radiation requires a protective shield of the following thickness, depending on the type of material: 28 cm (water); 9.9 cm (concrete); 1.8 cm (iron); 0.3 cm (lead).

In order to evaluate the possibility of creating IPG against gamma radiation, the available data on the

protective efficiency of various materials³ were used to determine the minimum weight of the most rudimentary IPG for the human body—a vest. For vest size of 110 cm around the girth of the chest and 100 cm in length, the surface area of the vest is around 1.1 m². Results of calculation of the weight of a vest affording twofold protection against gamma radiation show that there is no point in using polymer materials or iron to fabricate IPGs against gamma radiation, since the weight of such IPGs, even for a protection factor of 2, would be hundreds of kilograms. A lead vest would weigh the least amount; but even so, the amount of weight it would need to ensure twofold protection against gamma radiation with energy of 0.3 MeV is 37 kg, and the weight quickly increases as radiation energy rises. A gamma-quanta energy level of 0.8 MeV would require a vest weighing around 125 kg.

It should be pointed out that these calculations did not take account of the irradiation of the human body through the openings for the arms, legs, and head. Consequently, we may conclude that even very heavy protection gear (weighing more than 40 kg) will reduce the gamma radiation dose rate for the human body by less than half.

Thus, the published scientific data, based on laws of the interaction of gamma radiation and matter that are thoroughly explored in theory and confirmed in experiment, testify to the impossibility of creating IPGs that are light, yet effectively protect against gamma radiation. Not even the most efficient of the naturally occurring elements—lead and bismuth—provide the required protective features, with a tolerable weight for the protective gear. There is no point in using IPGs weighing 40 kg or more, since even a physically powerful man will move much more slowly in such garb and will ultimately receive a higher radiation dose as a result of spending more time in the field of gamma radiation.

The safety of personnel working in fields of gamma radiation may be secured by carefully measuring the gamma radiation dose rate in the area where the work is performed and by using these data to compute the allowable duration of work ("protection by time"), by preventing the person (or parts of the body—arms, legs) from coming near local sources of radiation, by performing the work remotely with rods, manipulators, grips, and so on ("protection by distance"), and by using protective walls, shields, booths, and the like. The last technique, when used properly, can have a quite marked effect. Thus, according to the data reported by Broadley,⁴ use of a crane-moved lead box weighing a total of 5 tons, with an area of 0.9 x 0.9 m² and a height of 2.4 m, and consisting of three walls and a base, made it possible to reduce the external irradiation dose to at least a tenth during repair and decontamination work on an experimental reactor.

The main conclusion is that the creation of IPG against the gamma radiation of fission products and other sources with energy levels greater than 100 keV is not

possible, and the safety of the personnel when working in fields of gamma radiation should be provided by other means.

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UDC 612.825:612.014.42:615.214.22

Influence of γ -Aminobutyric Acid Antagonist Tetraazaadamantane Disulfate on Evoked Responses of Neurons in Hippocampal Sections

18400526 Kiev NEYROFIZIOLOGIYA in Russian
Vol 21 No 1, Jan-Feb 89 (Manuscript received
25 Jan 88) pp 66-70

[Article by G. Ya. Pervukhin (deceased), I. N. Sharonova, S. Ye. Prokofyev, N. B. Fedorov, S. A. Kotelnikov, V. I. Fetisov, I. V. Martynov, Institute of Physiologically Active Substances, USSR Academy of Sciences, Chernogolovka, Moscow Oblast; Institute of the Brain, All-Union Scientific Research Center of Mental Health, USSR Academy of Medical Sciences, Moscow]

[Abstract] The ability of tetraazaadamantane disulfate (TAAD) to cause convulsive activity has long been known. There are indications that TAAD is a γ -aminobutyric acid antagonist like picrotoxin. The lethal dose of TAAD in intraperitoneal administration to mice is one-fourth that of picrotoxin. This article studies the influence of TAAD on the summary electrical activity of the hippocampal pyramidal cells as indicated by changes in the structure of the focal potential. The results indicate that both picrotoxin and TAAD have a clear, reversible and dose-dependent facilitating effect on excitation of Ca_v pyramidal cells of the hippocampus. Figures 2; References 15: 3 Russian, 12 Western.

UDC 577.391;576.8;576.5

Influence of Tularemia Vaccine on Radiosensitivity of White Rats Upon Exposure to X-Radiation

18400535 Moscow RADIOBIOLOGIYA in Russian
Vol 29 No 1, Jan-Feb 89 (Manuscript received 16 Jul 87)
pp 113-116

[Article by V. N. Zilfyan, V. A. Kumkumadzhyan, A. K. Nersesyan, Kh. A. Tonapetyan, Oncologic Science Center, Armenian Health Ministry, Yerevan]

[Abstract] Many killed and live bacterial vaccines increase radioresistance. However, the first day after vaccination the opposite effect is observed. The live dry tularemia vaccine widely used in the Soviet Union has been little studied in this respect, and the literature contains contradictory reports. This article studies the influence of the tularemia vaccine on the radioresistance of rats. Significant improvements are seen in survival percentage, mean duration of life among animals that did not survive, and number of blood leukocytes. It is suggested that the increase in radioresistance of rats vaccinated with the tularemia vaccine 15 days before exposure to X-radiation is a combination of physiological changes developing after administration of the foreign antigen. The effect of the vaccine was less pronounced with higher levels of radiation. References 14 (Russian).

UDC 616-092:612.017.1]-02:613.648.4]-092.9-07

Cellular Basis of Late Immunodeficiency After Chronic Radiation Exposure

18400541a Moscow IMMUNOLOGIYA in Russian No 1,
Jan-Feb 89 (manuscript received 20 Oct 88) pp 32-34

[Article by Ye. N. Kirilova, L. D. Murzina and K. N. Muksinova]

[Abstract] Wistar rats and CBA mice were employed in a study designed to assess the cellular basis of late immunodeficiency following long-term internal irradiation. The model system involved drinking tritiated water for 180 days, starting when the animals were 8-10 weeks old, for a total dose of 9 Gy in the case of the mice and 25 Gy for the rats. Subsequent monitoring of the lymphoid organs was continued for one year after tritium administration was discontinued. Immunologic analysis demonstrated depletion of pluripotent stem cells by 25-30% in the Wistar rats and by 20-80% in the CBA mice. These changes were particularly evident in the case of the T-cells, both in terms of cell counts and function of the central and peripheral lymphoid tissues. Recovery of the B-lymphocytes advanced to levels approaching normal baseline 3-6 months after tritium intake was terminated. Long-term hypoplasia of the thymus and the lymph nodes of the type observed in this experimental model has previously been implicated in predisposition to severe inflammatory and neoplastic complications. References 11: 10 Russian, 1 Western.

UCD 612.8.014.482+616.8-001.29-07

**Effects of Ionizing Radiation on Nervous System:
Literature Review**

18400543b Moscow *ZHURNAL NEVROPATOLOGII I
PSIKHIATRII IMENI S. S. KORSAKOVA* in Russian
Vol 89 No 2, Feb 89 pp 138-142

[Article by A. K. Guskova and I. N. Shakirova]

[Abstract] The Chernobyl tragedy has increased interest among neurologists in the neurological sequelae of exposure to ionizing radiation. A review of the currently

available literature shows that despite the various mechanisms underlying the pathologic changes, a certain threshold level of radiation has to be exceeded for the induction of biochemical and morphological lesions. In cases with whole-body irradiation the threshold consists of 2 to 4 Gy, whereas the threshold in situations with local irradiation is on the order of 10 to 50 Gy. Consequently, involvement of the central nervous system is to be expected only in patients with severe or extremely severe acute radiation sickness, or in individuals subjected to heavy irradiation of the brain. Recently, in addition to the generally accepted direct and indirect pathogenetic mechanisms, autoimmune processes have been implicated in exacerbating neural radiation effects. References 25: 11 Russian, 14 Western.

UDC 613.648.4-078.73

Immunity Status Upon Exposure to Radiation

18400485A Moscow GIGIYENA I SANITARIYA in Russian No 1, Jan 89 (Manuscript received 17 Sep 87) pp 25-28

[Article by V. M. Shubik, Leningrad Scientific Research Institute of Radiation Hygiene; RSFSR Health Ministry]

[Abstract] Results are presented from studies by the author and from data in the literature on ^{137}Cs , ^{90}Sr radiation and its effect on nonspecific immunity of experimental animals. A number of characteristics of nonspecific immunity are found to be quite sensitive to ionizing radiation, making them useful as early signs of unfavorable reaction of the body to radiation. They include impairment of nonspecific humoral and cell protection and the T- and B-immunity systems and autosensitization. Tables illustrate minimum doses at which the effects occur. References 28: 14 Russian, 14 Western.

UDC 577.391.599.323.4

Central Control of Nociception in Rats After Exposure to High Doses of Ionizing Radiation

18400604B Moscow RADIOBIOLOGIYA in Russian Vol 29 No 2, Mar-Apr 89 (manuscript received 16 Dec 87) pp 183-187

[Article by A. A. Abdrakhmanov, V. G. Vladimirov, G. K. Aytkhozina and I. N. Lashkul, Institute of Nuclear Physics, Kazakh SSR Academy of Sciences, Alma-Ata; Military Medical Academy imeni S. M. Kirov, Leningrad]

[Abstract] An analysis was conducted on nociception in male albino rats, 160-210 g in weight, following 150 Gy gamma irradiation. Monitoring of the animals over a 24 h period showed a statistically significant increase in the response time to thermal insult in the tail-flick test ($p < 0.01$) at 3 and 24 h. Concomitantly, at the corresponding periods of time the nociceptive threshold to electrical stimulation diminished as evidenced by the decrease in the vocalization threshold ($p < 0.01$). Ultrastructural studies of layers IV and V of the somatosensory cortex demonstrated changes reflective of altered permeability of the blood-brain barrier. Thus, during the entire 24 h postradiation period the response to thermal and electrical pain stimuli demonstrated an inverse relationship in terms of the latent times. These findings were interpreted to indicate a decrease in the threshold of the emotional-behavioral component of the pain response and enhancement of the perceptive component. This may reflect a radiation-induced perturbation in the interaction of nociceptive and antinociceptive mechanisms. Figures 2; references 12: 7 Russian, 5 Western.

UDC 577.391.546.79

Effect of Liposomal Pentacin on Plutonium-239 Excretion

18400604C Moscow RADIOBIOLOGIYA in Russian Vol 29 No 2, Mar-Apr 89 (manuscript received 8 Feb 88) pp 197-201

[Article by L. A. Ilyin, A. T. Ivannikov, G. A. Altukhova, I. M. Parfenova and T. V. Chelysheva, Institute of Biophysics, USSR Ministry of Health, Moscow]

[Abstract] A comparative study was conducted on the efficiency of free and liposomally-enclosed pentacin in promoting the excretion of Pu-239. The data showed that intravenous administration of 100 $\mu\text{moles/kg}$ liposomal pentacin two days after Pu-239 induced the excretion of 23.5% more Pu-239 than did an equivalent dose of free pentacin. Whereas only 2.1% of Pu-239 was excreted in untreated control animals over a 6-day period, administration of liposomal pentacin led to excretion of 38.2% of the radionuclide, and free pentacin to 31%. Administration of pentacin reduced tissues levels of Pu-239 by 14-84% in comparison with untreated animals, with the liposomal preparation again shown to be more efficacious than the free preparation, with the exception of the femur, where the free pentacin was shown to be more efficient. Administration of both preparations 20 days after Pu-239 treatment again demonstrated that liposomal pentacin promoted the excretion of 28% more Pu-239 than did the free form. Finally, studies with rats confirmed the experiments on dogs. Intraperitoneal liposomal pentacin given 40-45 days after Pu-239 injection enhanced excretion of 40% more Pu-239 than did the free pentacin. These findings demonstrated that liposomally encapsulated pentacin is superior to free pentacin in promoting excretion of Pu-239. Figures 2; references 8: 5 Russian, 3 Western.

UDC 577.391.575.24

Study of the Possibility of Modifying the Cytogenetic Action on Chinese Hamster Fibroblasts of Secondary Emissions of 70 GeV Protons

18400604F Moscow RADIOBIOLOGIYA in Russian Vol 29 No 2, Mar-Apr 89 (manuscript received 3 May 88) pp 262-264

[Article by I. A. Livanova, S. I. Zaichkina, G. F. Aptikayeva, A. V. Antipov, A. K. Akhmediyeva and Ye. E. Ganassi, Institute of Biological Physics, USSR Academy of Sciences, Pushchino]

[Abstract] In view of the demonstration that chromatin proteinases are involved in cytogenetic injuries, trials were conducted with phenylmethylsulfonyl fluoride (PMSF), a proteinase inhibitor, as an agent that may limit radiation injuries. The experimental model consisted of an asynchronous Chinese hamster fibroblast culture subjected to the secondary emission of 70 GeV

protons (1-5 Gy, 1.2 Gy/min). In part, the study was designed to address a key question in space medicine in which high energy particles of the type encountered in the secondary emission of protons—i.e., protons, pions, neutrons, and mesons—may pose a significant health risk. Determination of the percentage of cells with micronuclei demonstrated that PMSF exhibited an effectiveness of modification (E_m of approx. 2.2, i.e., addition of PMSF to the culture led to a approx. 50% reduction in cells with cytogenetic damage. Addition of nicotinamide to the culture was essentially without protective benefit (E_m = approx. 1.0), indicating that attenuation of cytogenetic damage by PMSF did not involve poly(ADP)-ribosylation. Figures 1; references 10: 5 Russian, 5 Western.

UDC 612.014.482.4+612.273

Modifying Effect of Oxolinic Acid in Radiation-Induced Hemorrhagic Syndrome

18400604H Moscow *RADIOBIOLOGIYA in Russian* Vol 29 No 2, Mar-Apr 89 (manuscript received 7 Apr 88) pp 276-278

[Article by V. N. Tartakovskiy and V. V. Pukhov, Kirghiz State University, Frunze]

[Abstract] Experimental trials on the therapeutic benefits of oxolinic acid in radiation-induced hemorrhagic syndrome were performed with guinea pigs (300-400 g) subjected to 3 Gy gamma irradiation. Oxolinic acid was administered intraperitoneally (200 mg/kg) 15 min before irradiation, and the clinical manifestations of radiation injuries were monitored for 30 days thereafter. The results demonstrated that pretreatment with oxalinic acid diminished the area of hemorrhage in the lungs fivefold, in the stomach 25-fold, in the subcutaneous fatty tissue threefold, and in the muscles fourfold. In addition, thrombocyte levels in the oxalinic acid-treated animals were twofold higher and the elasticity of the blood clot four times greater than in untreated control guinea pigs. The radioprotective benefits obtained with oxalinic acid were less impressive than

those obtained with cystamine (150 mg/kg s.c.). However, the relative nontoxicity of oxalinic acid indicates that it deserves further attention. References 5: 4 Russian, 1 Western.

UDC 616.12-77-059:615.849.114]-07:616-001.28-033-091

Pathomorphology of Sequelae of Chronic Radiation from Gamma-Neutron Source Implanted in Abdominal Cavity

18402070A Moscow *MEDITSINSKAYA RADIOLOGIYA in Russian* Vol 34 No 3, 89 (Manuscript received 10 Feb 88) pp 70-75

[Article by A. Ye. Ivanov, V. T. Vasilenko, Yu. M. Kiselev, T. G. Mosidze, A. I. Krylova, V. S. Suskova, Scientific Research Institute of Transplantation Studies and Artificial Organs, USSR Ministry of Health, Moscow]

[Abstract] The creation of an artificial heart with an independent motor has required evaluation of the biological effect of an encapsulated radiation power supply with a low-power gamma-neutron source in the abdominal cavity. Studies are required to determine means for protection from radiation and gain an idea of the general and local reaction of the body to chronic gamma-neutron irradiation. Animal experiments on dogs and sheep indicated that during the first year, necrobiotic-dystrophic and sclerotic changes in the tissues gradually accumulated near the radiation source. After 12 months, there were indications of depressed hematopoiesis in the bone marrow of the vertebrae adjacent to the radiation source, plus sclerotic thickening of the fibrous capsule and initial sclerosis of the parenchyma of the left kidney. Clear bone marrow aplasia, reduction of lymphatic follicles of the spleen and abdominal lymph nodes were observed after 33 months. The studies showed that the radiation source causes general and local reactions of the hematopoietic system and other organs similar to those observed with an external radiation source of equivalent power and characteristics. Figures 4; References 7 (Russian).

Treatment of Chronic Infections

18402075A Moscow VETERINARIYA in Russian
No 3, Mar 89 pp 11-12

[Article by I. I. Yantsen, chief veterinarian, Kemerovo-agroovoshcheprom Agricultural Association]

[Abstract] A history of chronic infection of cattle on the state farms subordinate to the association is presented. It is noted that brucellosis was eliminated in 1977 by destroying all animals tested positive. Tuberculosis was discovered in 1983, and it was eliminated in subsequent years by measures such as destruction of animals, frequent examinations and strict observation of sanitary conditions, construction of fences and, at the entrance to one farm, installation of a veterinary-sanitary checkpoint. Long experience shows that the most important problem in controlling tuberculosis in cattle is timely diagnosis of the disease, with reliable isolation and slaughtering of infected animals.

UDC 619:614.9:614.48:666.924:616.981.42+616-002.5

Disinfection with Freshly Slaked Lime in Brucellosis and Tuberculosis

18402075B Moscow VETERINARIYA in Russian
No 3, Mar 89 pp 28-29

[Article by I. Ya. Belyayev, I. I. Barabanov, V. F. Brichko, All-Union Scientific Research Institute of Veterinary Sanitation]

[Abstract] Control of brucellosis and tuberculosis among animals requires repeated disinfection of animal husbandry areas. Slaked lime has a bactericidal property as a result of its alkalinity. Disinfection is performed using 10 and 20% suspensions of freshly slaked lime, prepared by adding 1 kg of unslaked lime to 1 liter of water. Lime can be used to treat structures as well as soil. Unslaked lime is irritating to moist skin and mucous membranes, and therefore workers must wear protective clothing and goggles.

UDC 578.835.15:578.72:578.5

Selective Cell Resistance of Human Neuroblastoma Cells to Polio Virus Vaccine Strain*18400454b Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 305 No 4, Apr 89 (manuscript received 6 Mar 88) pp 987-989*

[Article by Ye. A. Tolskaya, M. S. Kolesnikova, USSR Academy of Medical Sciences Member, S. G. Drozdov, and V. I. Agol, Institute of Polio and Viral Encephalites, USSR Academy of Medical Sciences, Moscow Oblast]

[Abstract] Along with the neurovirulent strains of polio virus (PV) there exist attenuated strains which can be used for vaccination purposes. The molecular basis for the biological differences between these strains is of great theoretical and practical interest. Intensive studies have identified several point mutations responsible for this attenuation. However, because of the lack of an adequate experimental model, further progress has been slow thus far; biological differences between the "wild" and the vaccine strains seen in infected monkeys have been rather small in experiments with infected cells. It was shown in the present work that multiplication of the attenuated strains of PV is very limited in the in vivo cultivated cells derived from human neurons. In a previous work, the authors showed that attenuating mutations in the vaccine strain of PV are localized primarily at the 5'-half of viral RNA. Therefore multiplication of two PV recombinants was studied in neuroblastoma cells in which about one half of the genome came from the virulent and the other half from an attenuated type 1 parent; one of the recombinants inherited the 5' genome moiety from the attenuated parent, the other getting the 3'-half from this parent. The results showed that the genetic determinants responsible for the inability of type 1 PV vaccine strains to reproduce in neuroblastoma cells are localized both on the 5'- and 3'-terminals of the genome, the 5'-segment being more significantly involved in this. Figure 1; references 11: 3 Russian, 8 Western.

UDC 614.7:615.284.7.065)-084

Evaluation of Safety of Viruses Used to Control Harmful Insects for Man and Environment*18400485B Moscow GIGIYENA I SANITARIYA in Russian No 1, Jan 89 (Manuscript received 18 May 87) pp 43-48*

[Article by V. L. Vasilyeva, A. L. Gural, Kiev Scientific Research Institute of Epidemiology and Infectious Diseases imeni L. V. Gromashevskiy]

[Abstract] A number of effective biological preparations based on baculoviruses have been developed in the USSR for control of dangerous plant pests. An experimental installation has been created for development of technological processes for manufacture of three viral preparations which have undergone state testing and have been

recommended for use. The authors' institute is now studying the safety of entomopathogenic viruses and biological preparations based on them. New data have been obtained on the interaction of the baculoviruses with humans and vertebrates. The preparations have been shown to be nontoxic and noninfectious for man and vertebrates, but have been shown to be able to penetrate into human blood following inhalation and oral administration, causing the appearance of specific immune reactions and the development of delayed hypersensitivity. Thus, many problems related to safety remain to be solved before the substances can be widely used to replace chemical pesticides. References 50: 19 Russian, 31 Western.

UDC 578.828.6:578.233.4/.7].04:[615.355:577.152.34].08

Suppression of HIV Reproduction in Tissue Culture by Proteolysis Inhibitors*18400536A Moscow VOPROSY VIRUSOLOGII in Russian Vol 34 No 1, Jan-Feb 89 (manuscript received 21 Jan 88) pp 53-55*

[Article by A. G. Bukrinskiy, M. N. Korneyeva, D. N. Nosik and V. M. Zhdanov (deceased), Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] Tissue culture trials were conducted to evaluate selected protease inhibitors for their efficiency in limiting HIV reproduction in tissue culture as a possible step toward in vivo studies on AIDS therapy. The agents in question were represented by the drugs gordox (Gedeon Richter, Hungary) and kontrikal (Hermed, GDR) added to human peripheral lymphocytes cultured in RPMI-1640 medium, supplemented with 10% interleukin-2, prior to infection with HIV. The inhibitors were added at 6-12 h intervals for 6 days in concentrations ranging from 10 to 250 U/ml. The resultant data demonstrated that 25-100 U/ml gordox was effective in reducing the number of infected cells 1.5- to 2-fold, with higher cell viability seen with the longer interval. Kontrikal yielded essentially similar results when used in concentrations twice as high as gordox. Finally, trials with ϵ -aminocaproic acid in concentrations of 20-100 mg/ml showed less efficient inhibition of HIV reproduction; in addition, the agent itself showed considerable cytotoxicity. These observations suggest that protease inhibitors should be evaluated in AIDS treatment. Figures 1; references 7: 2 Russian, 5 Western.

UDC 616.98:578.833.26]-036.11-092.9:612.017.1]-07

Relationship Between Immune Status and Pathogenetic Factors in Acute Experimental Tick-Borne Encephalitis*18400536B Moscow VOPROSY VIRUSOLOGII in Russian Vol 34 No 1, Jan-Feb 89 (manuscript received 17 Aug 87) pp 89-92*

[Article by G. I. Larina, Institute of Poliomyelitis and Viral Encephalites, USSR Academy of Medical Sciences, Moscow]

[Abstract] Research data are reviewed on the interrelationships between the immune status of outbred mice weighing 6-8 g and pathogenetic factors in tick-borne encephalitis (TBE) induced by four viral strains. The data revealed considerable differences in the duration of the pathologic process, outcome, clinical manifestations, induction of specific immunity, and mortality. For example, the mean incubation periods for the Sofia, Absettarov, Pan, and Ayna strains of the TBE virus were, respectively, 5, 10.8, 10.8, and 9.7 days. The corresponding mortality figures for these strains were 12, 67.8, 65, and 76%, respectively. Similarly, differences were noted in the levels of immunity attained, as well as in the immune status of the animals on the basis of rosette formation, thymic weight, immunoglobulin levels, etc. These observations demonstrated the importance of the interplay of individual immune status and properties of the individual TBE virus strains in determining the nature and outcome of TBE. Figures 1; references 1 (Russian).

UDC 616.98:578.833.26]-07:616.153.962.4-097

Dynamics of Antigen and Antibody Accumulation in Mature Mice Infected with Lassa Virus

18400536C Moscow VOPROSY VIRUSOLOGII in Russian Vol 34 No 1, Jan-Feb 89 (manuscript received 9 Jun 87) pp 100-103

[Article by A. S. Vladko, L. Ye. Surikova, L. P. Kramarenko, S. I. Bystrova and A. V. Torop, Belorussian Scientific Research Institute of Epidemiology and Microbiology, Belorussian SSR Ministry of Health, Minsk]

[Abstract] Outbred mice weighing 20-22 g were infected subcutaneously with low doses of Lassa virus (Josiah strain) to define the accumulation patterns of antigen and antibodies. The use of a number of conventional serological techniques as well as plaque assay demonstrated that in the early stages of infection peaks of infectious virus in the blood were detected on days 4 (2.9 log PFU/ml) and 14 (2.6 log PFU/ml), and lower levels persisted through the 60th day of monitoring. Virus-neutralizing antibodies peaked on days 6 and 30, with IgM antibodies appearing within 24-36 h of infection and IgG detected after 2-3 weeks. Furthermore, whereas the virus was detected in the brain and the kidneys only in the early stages of infection (10 days), on days 45 and 60 the virus was detectable only in the spleen and the liver. Despite prolonged presence of the Lassa virus in the blood, its absence in the kidneys after the first few days indicates that the outbred mice do not secrete the virus and do not pose a health risk over the long run. Figures 4; references 11: 3 Russia, 8 Western.

UDC 619:615.371:616.981.51:616.981.57:636.22/.28

Associated Live Vaccine Against Anthrax and Blackleg

18400595a Moscow VETERINARIYA in Russian No 4, Apr 89 pp 29-30

[Article by K. R. Urguyev, L. V. Kirillov, G. I. Romanov, L. I. Storozhev, A. A. Manichev, Caspian NIVI, All-Union State Scientific Design Institute for Veterinary Preparations]

[Abstract] Scientists have long been studying the problem of simultaneous specific prophylaxis of several infectious diseases. An original live associated vaccine against anthrax and blackleg in cattle was developed using an attenuated strain of *Clostridium chauvoei* 2/14. Strain STI-1 was the anthrax antigen. The results of a study of the immunizing activity and experimental use of the associated live vaccine against anthrax and blackleg are presented. The vaccine was used in 1984 to vaccinate 5,360 animals ranging in age from three months to four years on 18 farms in various climatic zones. Animals 3-6 months old were immunized subcutaneously with 1 ml of the vaccine; animals older than six months were given 2 ml. The animals 3-4 months old were revaccinated three months later. Over a year's time, none of those vaccinated contracted either disease. Some 158,000 animals were vaccinated in 1986, with no reported cases of either disease and no complications or negative side effects; the same was true of 217,912 animals vaccinated in 1987. Calves immunized at six months of age were resistant to the disease a year later, when they were infected with a lethal dose of virulent *C. chauvoei* culture. Immunity begins between days 10 and 15 after immunization against anthrax, and between days 5 and 6 after immunization against blackleg. The associated live vaccine fully retained its antigenic and immunogenic properties for 12 months (the observation period) at 4-8°C.

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Using Enzyme Immunoassay (EIA) to Diagnose Listeriosis

18400595B Moscow VETERINARIYA in Russian No 4, Apr 89 pp 60-62

[Article by D. A. Vasilyev, P. I. Baryshnikov, All-Union Scientific Research Institute of Veterinary Virology and Microbiology]

[Abstract] EIA techniques have been widely used in recent years in the diagnosis of infectious diseases. number of variations of EIA exist, their use depending on the nature of the substances being determined and the purpose of the testing. Techniques that are combined under the name homogenic EIA involve the process of inhibiting the enzyme activity of a conjugate during interaction with dissolved antibodies, whereas techniques called solid-phase, or heterogenic, EIA involves separation of reaction components using immobilized antibodies (antigens). The latter group, referred to as ELISA in the West, is used in the serologic diagnosis of infectious diseases. The literature indicates that EIA has been used widely in the identification of antibodies and antigens in relation to virtually all known groups of viruses that cause disease in animals. Using EIA for diagnosing bacterial infections, however, runs into difficulty because the antigen structure of bacteria is much more complex than that of viruses and bacterial diseases are much more widespread than are parasitic diseases. Because there are no reliable serological tests for diagnosing listeriosis, the researchers studied the possibility

of using indirect solid-phase EIA for that purpose. EIA was found to compare favorably with other serological tests for specificity and is much better than others when testing for sensitivity. The researchers conclude that it is best to use a preparation obtained from disintegrated listeriosis cells in EIA, which they recommend for diagnosing listeriosis infections.

UDC 576.895.421.542.74

Effects of High Concentrations of Carbon Dioxide on Ixodid Ticks

18402080B Leningrad PARAZITOLOGIYA in Russian Vol 23 No 2, Mar-Apr 89 (manuscript received 7 Jan 88) pp 118-128

[Article by R. L. Naumov and V. P. Gutova, Institute of Medical Parasitology and Tropical Medicine imeni Ye. I. Martynovskiy, Moscow]

[Abstract] *Ixodes persulcatus*, *Dermacentor reticulatus*, and *D. marginatus* were used to assess the anesthetic effect of high concentrations of carbon dioxide in relation to temperature. The experimental conditions involved exposure to 50, 70, 80 and 90% CO₂ for 10 min at 18°C and 26°C. Analysis of the results derived from 1,413 specimens demonstrated that the onset of anesthesia and its depth was directly related to the concentration of CO₂ and inversely related to the temperature. Additional experiments were used to demonstrate that exposure of the ticks to 100% humidity increased tick susceptibility to the gas. The mechanism for the efficacy of CO₂ appears to involve greater solubility of the gas in the hemolymph at lower temperatures, as well as greater opening of the atrial valve at high humidity, allowing

greater access of CO₂ across the stigma into the trachea. Figures 9; references 10: 1 Russian, 9 Western.

UDC 578.282

Inhibition of Replication of Hepatitis B Virus in Man

907C0201A Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 23 No 4, Jul-Aug 89 pp 983-987

[Article by V. V. Tsibinogin, A. A. Krayevskiy, R. Sh. Bibilashvili, E. Ya. Gren and L. L. Kiselev; Institute of Organic Synthesis, LaSSR Academy of Sciences, Institute of Molecular Biology imeni V. A. Engelhart, USSR Academy of Sciences, Institute of Experimental Cardiology, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences]

[Abstract] A study of the effect of dTTP(3'-N₃) and some other nucleoside 5'-triphosphate analogs on human hepatitis B virus synthesis in a acellular system with virions was described and discussed. Different inhibitors affected suppression of DNA to a different degree. The most effective inhibitor was 3'-azido-2',3'-dideoxythymidine 5'-triphosphate which suppressed DNA virus synthesis by 50 percent at ratio of molar concentrations of inhibitor to substrate of 1:8 and by 80 percent at a 1:1 ratio. It was assumed that the inhibiting effect of 3'-azido-2',3'-dideoxythymidine 5'-triphosphate involves termination of RNA-directed DNA synthesis at one of the stages of virus replication due to incorporation of the analog into the third position of the growing DNA chains. Figures 4; references 26: 6 Russian; 20 Western.

Problems of Creating Fermentation and Hydrolysis Equipment

18400398 Riga IZVESTIYA AKADEMII NAUK
LATVIYSKOY SSR in Russian No 12, Dec 88

[Article by U. Viyestur]

[Text] Irkutsk Scientific Research Institute of Chemical Machinery is a design organization which develops fermentation and hydrolysis equipment. Therefore, organization of the 2d All-Union Scientific and Technical Conference "Basic Trends of Creation and Improvement of New Equipment for the Medical and Microbiological Industry" (7-9 June 1988, Irkutsk) is logical.

Representatives of sectoral, collegiate and academic science attended the conference. Representatives of the basic customer, the Ministry of the Biomedical Industry USSR, also attended.

The conference included 3 sections: 1) "Equipment for Microbiological Synthesis Processes", 2) "Equipment for Hydrolysis of Different Kinds of Plant Raw Material" and 3) "Reliability, Strength and Durability of Equipment".

It was noted that, in recent years, new equipment developed and manufactured by Ministry of Chemical Machinery plants is used extensively at Ministry of the Biomedical Industry enterprises. Fermenters for production of fodder yeasts from petroleum n-paraffins, hydrolyzates of plant raw material, for lysine and antibiotics productions (yeast germinator apparatus ADP-900-1K-01, 630 m³ and 1250 m³ volume fermenters and 2.5 m³, 6.3 m³, 10 m³, 16 m³ and 63 m³ fermenters for aseptic processes) are being produced and are in serial release. Driers, separators, evaporators, 25, 50 and 80 m³ periodic action hydrolyzers, laminar heat exchangers, filters and other equipment are in serial release.

Experimental samples of new apparatus are being developed and manufactured. These include a 320 m³ column gas-lift fermenter for producing albumin from alcohols and an FKER-750 type fermenter for haprin production.

A completely automated separator for protein-vitamin concentrate production with productivity of 100 m³/hr according to yeast suspension is at the finishing stages.

Equipment for continuous hydrolysis of tanning waste for fufurol production with productivity of 2.6 t/hr in absolutely dry substance is being developed and manufactured. A steel-lined continuous action, 80 m³ volume, hydrolysis apparatus is being developed. Fermenters with volumes of 0.005, 0.025, 0.1 and 0.250 m³ for cultivating microorganisms on microcarriers for State Agricultural Industry USSR for microbiological productions are prepared and recommended for series production.

It was announced at the conference that the Ministry of the Biomedical Industry intends to create its own machine construction. New apparatus and equipment

are being created within the framework of the Complex Program of scientific and technical progress of the Council of Mutual Economic Assistance countries. They include: a 200 m³ volume fermenter for growing fodder yeasts on hydrolyzates with sugar level up to 3.5 percent, a steel-lined, 20 m³ volume, continuous action hydrolysis apparatus; a separator using a microprocessor technique with 250 and 450 m³/hr productivity in initial suspensions for fodder yeasts productions; a tumbler granulator with use of a fluidized layer and membrane devices for sterilizing microfiltration and others.

Scientific research and experimental design studies for creation and finishing of new intensive technologies of high temperature and fermentative hydrolysis, technology of cultivating fodder yeasts on the basis of aeration by an oxygen-air mixture with a closed gas feed cycle which improves the environment, increases productivity of apparatus and the economic efficiency of fodder protein production are being conducted.

In addition to positive aspects in creation of experimental samples and series production of equipment, there are problems which require their own solution in order to achieve a high technical level of equipment released, equal to the best samples in the world. These include: intensive and ecologically safe technologies, creation of new construction capable of competing and modernization of effective equipment for new and existing technologies, improvement of the quality of production, reduction of metal and energy consumption, improvement of the technical level of articles making up a set (fittings, drives with magnetic couplings, systems for cleaning and sterilizing the environment and others), development and use of control systems based on microprocessor technology, absence of a single approach for assessing the efficiency of fermenters, a method for their design, no method for assessing the indicators of purpose of fermenters and diagnosis of the hydrodynamics of gas-liquid systems, organization of the cycle of development, testing and introduction of experimental samples is not up-to-date and this leads to inadmissibly long periods of creating new equipment, comparatively few studies and appropriate constructions for carrying out new biotechnology (for biocatalysis, growing animal and plant cells and others).

The LatSSR was rather well represented by the Institute of Microbiology imeni Avgust Kirkhenshteyn and the Institute of Chemistry of Wood. M. A. Rikmanis' address "Prospects for Improving Current Fermentation Apparatus by Mechanical Mixing" was quite interesting.

The conference recommended: - concentration of efforts on the development of intensive, ecologically safe technologies which ensure deep conversion of the starting material and of production wastes, including the growing of yeasts on hydrolyzed media with a high sugar content (3-5 percent), production of fodder protein based on synthetic raw alcohols, high-temperature and fermentation hydrolysis and others; creation of a new generation

of competition-capable equipment and complexes of equipment, oriented around flexible production-process lines;

- orientation on expansion of typical series of biotechnological equipment including column gas-lift type fermenters with mixers and other constructions for different kinds of raw material, standard documentation, methods and means of control and delivery of fermentation equipment to the customer according to machine construction parameters;

- expansion of studies aimed at improvement of existing and creation of new processes of continuous high-temperature and fermentative hydrolysis of different kinds of raw material, including farm wastes;

- intensification of work on development and organization of production of light and compact upper and lower drives with magnetic couplings; reliable face packings on diameters of shafts of more than 160 mm; magnetic-liquid packings for rollers of diameter of up to 100 mm of upper and lower drives; some low-energy systems of mechanical anti-foaming agents for aseptic and non-sterile productions; special pumps; small manual and automatic locking and regulating fittings for aseptic processes; filters for moderate and high purification of the air, apparatus and other equipment for processing culture liquids and producing finished commercial forms of various biotechnology products.

Representatives of the journals "Biotechnology" and "Chemical and Petroleum Machine Construction" attended the conference. The theoretical findings of the conference will be published in these journals; abstracts were published. Irkutsk Scientific Research Institute of Chemical Machinery made a small exhibition of developments in the form of colored posters and technical literature.

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Herbicides Toxicology Conference

18402170 Moscow VETERINARIYA in Russian No 5, May 89 pp 78-79

[Report by Z.A. Khamidullina on toxicology seminar]

[Excerpts] A seminar of toxicologist-veterinarians on the topic "Toxicological Assay of the Group 2,3-D Herbicides" took place in the Veterinariya Pavilion of the Exhibition of the Achievements of the USSR National

Economy and at the Central Veterinary Sciences Laboratory (TsVL) of the USSR Gosagroprom. Participants in the seminar included heads of toxicology departments of republic and regional veterinary laboratories and scientists engaged in the toxicology of herbicides and pesticides and in detecting their presence in nature and fodder.

Director of the TsVL B. I. Antonov summarized the work undertaken in the past year, analyzed the activity of the country's veterinary laboratory toxicology departments, and took note of problems such as those associated with personnel training, updating of skills, insufficient supplies of many chemical reagents and instruments, and poor quality of research.

V. V. Yermakov (All-Union Scientific-Research Institute of Veterinary Sanitation) reported on topics such as the methods used to assay fluorine, research development in analytical chemical studies of this element, diagnosis of poisoning in farm animal.

Methodological instructions for the chromatographic analysis of 2,4-dichlorophenoxy acetic acid in biological objects were demonstrated under laboratory conditions by V. D. Shulyak (Ukrainian Scientific-Research Institute of Experimental Veterinary Science).

Ye. I. Trutnev and Yu. V. Studentsov (Scientific-Research Institute of Veterinary Medicine, Kazan) reported on the detection of chloro- and phosphororganic pesticides in the targets of veterinary inspection and herbicides in fodders of plant origin.

Modern methods for detecting heavy metal salts, zoocides, and alkaloids in the targets of veterinary inspection was discussed by G. A. Alekseyev (Scientific-Research Institute of Veterinary Medicine, Kazan).

K. Kh. Papunidi and A. G. Abul Khanov from the same institute discussed the toxicology of poisons of bacterial and animal origin and methods for their detection as well as new apparatus and instruments.

Classes were held with the seminar participants on investigation systems for detecting poisonous substances.

N. V. Kovalev, A. P. Vereta, S. I. Tokiy, Ye. D. Zolotova, and many others shared their interesting experiences.

The work of the seminar was summarized by N. A. Sukhaya (TsVL).

The seminar participants familiarized themselves with the exhibit at the Veterinariya Pavilion and with methodological projects, pamphlets, and other literature.

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Lasers in Medical Practice

18400566E Moscow VOYENNO-MEDITSINSKIY
ZHURNAL in Russian No 2, Feb 89 pp 79-80

[Article by Col. A. P. Belokopytov, candidate of technical sciences]

[Abstract] The increasing importance of lasers in clinical medicine led to an interdepartmental workshop entitled "Prospects for New Laser Instruments and Novel Uses of Lasers in Medical Specialties," which was held in Vladivostok, 25-29 September 1988. The participants, representing various research establishments, dealt with the scope of laser application in clinical medicine, laser mechanisms of action, and design of improved laser beam delivery instruments. Research done to date has provided unequivocal proof that laser action may exert analgesic, anti-inflammatory, and stimulating actions. Argon lasers have been shown to be effective in the management of osteoarthritis and rheumatoid arthritis in 85.7% of the cases, helium-neon lasers in 82.1%, yellow liquid lasers in 89.6%, and infrared lasers in 87.5% of the cases. Recent developments have shown that combined magnetolaser therapy appears to represent a novel approach that has been shown to be very promising in the treatment of 115 patients with osteoarthritis. Recent advances have also seen the development of a the Raduga-1 endoscopic laser and an advanced form of the well-established surgical laser, Skalpel-3.

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(47+57)"1988"

**First All-Union Working Conference on
Application of Interferon Inducers in Radiobiology
and Oncology**

18402070B Moscow MEDITSINSKAYA
RADIOLOGIYA in Russian Vol 34 No 3, 89 pp 90-91

[Article by B. M. Klyachkin, Kemerovo Medical Institute]

[Abstract] The first All-Union Working Conference on Application of Interferon Inducers in Radiobiology and Oncology was held 7-9 June 1988 in Kemerovo and involved scientists from Moscow, Obninsk, Leningrad, Novosibirsk, Kemerovo, Minsk, and Kiev. Topics discussed at the conference included the use of interferon inducers to increase the effectiveness of radiation treatment of tumors; the immunostimulating activity of ds-RNA interferon inducer; the pharmacologic properties of ds-RNA; the negative effects of ds-RNA, including disruption of the detoxication function of the liver, mutagenic activity, production of blood circulation disorders, leukopenia and fever; the interferon titer in the blood serum and tumor tissues of patients with benign and malignant neoplasms with chronic inflammatory diseases; functional activity of the interferon system in pediatric papillomatosis patients before and during treatment with endogenous interferon; the use of Curantyl in patients receiving radiation therapy and surgery for malignant papillomas. The next working conference on the same subject is to be held in three years.

Development of Neurocomputers

81440643 Moscow KRASNAYA ZVEZDA in Russian
28 Dec 88 p 3

[Article by Rear Admiral Ye. Buzov, winner of the Lenin Prize, under the rubric "In the Laboratories of the World": "Neurocomputers. What Are They?"; first paragraph is KRASNAYA ZVEZDA introduction]

[Text] When developing computers, people always dreamed of such devices, which would solve perfectly and at a high speed not only difficult mathematical, but also logical problems, teach themselves, recognize patterns of a different physical nature, design, and even invent. What once seemed fantastic is today acquiring real forms. Confirmation of this is the discussion on the pages of the world press of the results of studies of neural networks, which were the basis for the development of a computer, which functions on the principles of the working of the brain, or a neurocomputer.

The term "neurocomputer" thus far has not become official, although this concept itself is connected with the sphere of the application of the neurosciences to the problem of information processing. Without laying claim to the strictness of the formulations, it is possible to say: a neurocomputer is a technical device, for which a model of the neural network for the solution of problems of artificial intelligence has been made the basis. In other words, a device, which operates according to the principle of the human brain, is being developed on the basis of "artificial neurons."

The neuron is the most unique creation of nature. Its amazing peculiarity is that through numerous short fibers—dendrites—it receives information and transmits this information, which has been processed in some specific manner, as nerve impulses to other neurons through a single long fiber—an axon. The neuron is a system with a large number (several thousand) of inputs and a single output. The external membrane of the neuron is capable of generating nerve impulses and transmitting information from one neuron to another.

The human brain consists of 15 billion neurons. This is approximately the same as the number of stars in our galaxy. Each neuron can be connected with thousands of others. Fundamentally new methods of research, new systems of concepts, and fundamentally new approaches to the study of the brain at the level of the understanding of the overall control of it as a most complex system are needed in order to understand how these immense and unique groups of neurons and the brain as a whole work and how the processing of the information, which is received from the sense organs, takes place.

A special element, which is developed on the basis of a model of the neuron and is some device with a large number of inputs and a specially organized output, should be basic in such computers. While a variable connection between these elements should be the main principle of their interaction.

Whereas a conventional digital computer processes information sequentially, uses strictly binary code, and performs complex mathematical computations accurately and quickly, the brain processes information in millions of channels with a significantly slower speed. It uses less accurate methods of signaling with allowance made for past experience and, in addition to solving complex mathematical problems, is capable of recognizing images, which a computer is incapable of doing. Let us add: our brain supports normal functioning when solving intellectual problems even in case of the death of a significant number of neurons, while in a computer in case of the failure of elements of the machine all computations are disrupted.

A curious fact. The Japanese firm Fujitsu developed a neurocomputer which processes information that is comparable to what 100,000 neurons are capable of processing. Meanwhile, modern supercomputers can perform operations in amounts which are characteristic of the possibilities of only six neurons of the brain.

What are the potentials of future neurocomputers? First of all one should speak about the recognition of patterns (various graphic symbols—printed and handwritten, photographs or television pictures, people and objects). Wave processes (the spectra and sonograms of many physical phenomena), acoustic signals, seismic waves, and electrical or other signals, which describe the state of a person (for example, electrocardiograms and electroencephalograms), are also grouped with patterns.

The creation of artificial neural networks is affording a thrilling prospect in the development of an intelligent neurocomputer. Such a device will be able to teach itself (without any quotation marks) in accordance with laws that are close to the human brain, to think logically, to comprehend spoken language, and to provide written printouts.

By teaching themselves, accumulating a significant data bank, having a high speed of retrieval of the needed information, and ensuring the descriptive analysis of information, neurocomputers of the future will probably be able to develop hypotheses, to make original generalizations, to recognize and analyze what is happening, and to present it in the form that the operator or user needs. As we see, the opportunity to work without so-called software, by elaborating a final solution on the basis of different versions of its "thought" activity, appears in the neurocomputer.

Such computers will be capable of not only elaborating solutions in the most difficult and even unforeseen situations, but also synthesizing knowledge with little assistance of man or without him.

Now existing computers are characterized by specific parameters, in accordance with which it is possible to compare them with each other. For neurocomputers the criteria of comparison have not yet been elaborated. However, it is possible to assume that the neuroparameter (let us provisionally call it this), which should

characterize the number of neuron-like elements that are incorporated in the computer, will be one of them. Another characteristic is the number of connections between the neuron-like elements and the information processing speed.

The American firm HNC characterizes its general-purpose neurocomputer (ANZA) by the following data: the number of neuron-like elements—30,000, the number of connections between them—300,000, the information processing speed—25,000 connections a second. The press has also reported on a more "powerful" neurocomputer of the firm TRW (250,000 neuron-like elements with 5.5 million connections between them) and on the plan to develop a system with 100 million neuroelements.

It should be noted that success in the development and introduction of neurocomputers involves the need to assimilate fundamentally new semiconductor technologies and to expand research in the field of neurobiophysics. The number of scientific publications, seminars, and conferences testifies to the scale of the basic and applied work which is connected with this direction. The first international conference on neural networks, in which hundreds of specialists participated, was held in 1987 in San Diego (the United States). The world congress in Budapest brought together thousands of delegates.

The definite rivalry of Japanese, American, and European companies in research on neural networks and neurocomputers has emerged. Western specialists believe that in 5 years neurocomputers will begin to be used extensively in practice. The basic results in the theory of the brain, which have been achieved by scientists, and the combining of the efforts of physicists and specialists in information processing, neurobiology, and electronics are a guarantee of success.

The key feature of the theory of neural networks and neurocomputers is the body of mathematics, by means of which the choice and optimization of the architecture of

the neurocomputers being developed are carried out. Such important sections of mathematics as the theories of probability, fuzzy (diffuse) logic, Markov random processes, operation research methods, and statistical physics, belong here. This list shows the complexity and "universal" peculiarity of the theory of neurocomputers.

However, in spite of the complexity and many-sided nature of the problem, it is necessary to acknowledge as an objective reality the appearance of a fundamentally new scientific direction, having stressed its revolutionary essence. This direction is capable of ensuring a breakthrough in the area of information science and in the development of thinking computers.

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Glass Tubular Reactor

18400598C Moscow *KHIMIKO-FARMATSEVTICHESKIY ZHURNAL*
in Russian Vol 23 No 4, Apr 89 (manuscript received
28 Mar 88) pp 484-486

[Article by V. V. Popov, S. N. Basov, A. N. Derevyagin, A. Ya. Turetskaya and Ye. B. Lopatin, All-Union Scientific Research Institute of Pharmaceutical Chemistry imeni S. Ordzhonikidze; All-Union Scientific Research Planning and Design Institute of Light Industrial Installations, Moscow]

[Abstract] Cursory technical details are presented on a glass plug-flow tubular reactor of the type that had been previously used for the synthesis of chloroacetaldehyde. The reactor is a tube-in-tube device that may operated either in turbulent regime with Reynolds numbers in the 10,000 to 24,800 range, or under conditions assuring laminar hydrodynamics with a Reynolds number of 2480. The reactor may also be used as a tubular heat exchanger and is suitable for other processes in pharmaceutical technology. The inner tube is made from Simax borosilicate glass, while the sleeve tube is made from Soviet 13V glass. The reactor tolerates temperature drops to 90°C on cooling and jumps to 120°C on heating. The small size of the reactor (3.97 x 1.58 x 0.64 m) renders it a convenient accessory in the laboratory. Figures 1; references 7 (Russian).

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